RAILROAD GAZETTE

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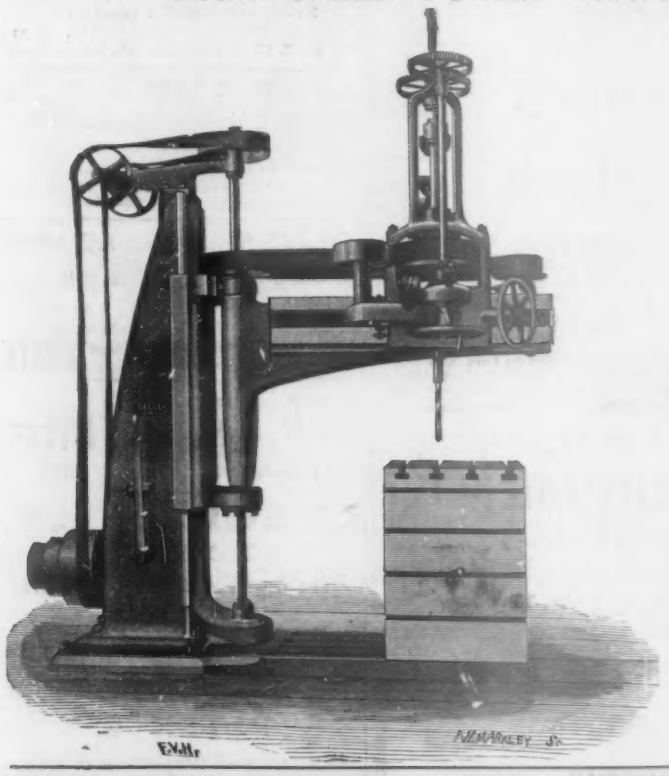

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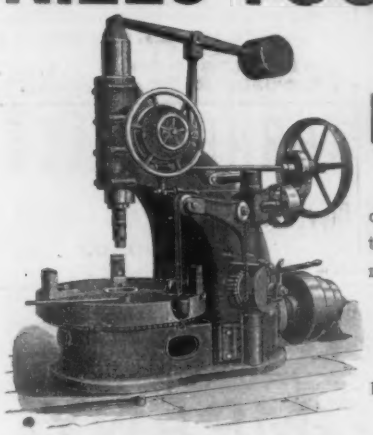

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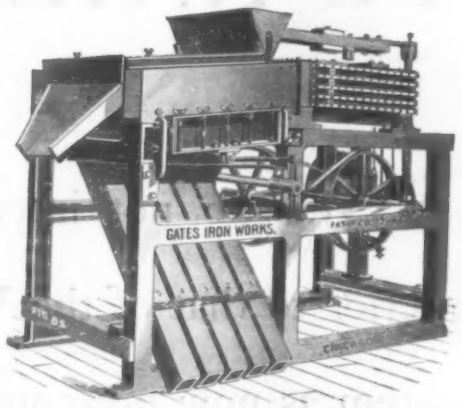

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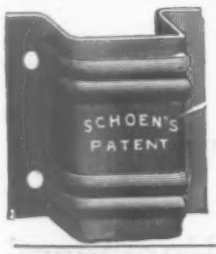

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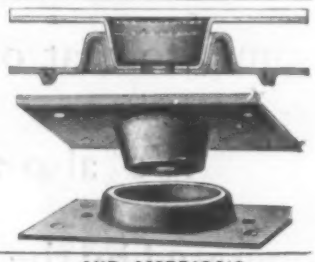

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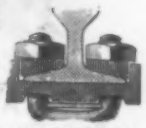

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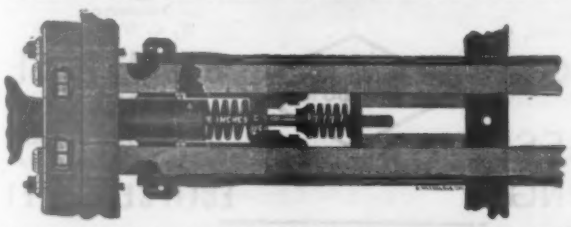

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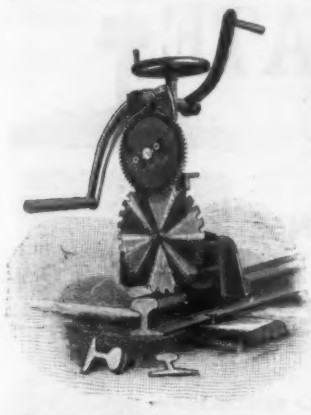

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Richard Dudgeon, 24 Columbia St., N. Y
Joseph F. McCoy Co., 26 Warren St., N.Y
Watson & Stillman, 210 E. 43d St., N. Y.

Hydraulic Machinery
Tinius Olsen & Co., Philadelphia, Pa.
Union Iron Works, San Francisco.
Watson & Stillman, N. Y. City.
R. D. Wood & Co., Philadelphia, Pa.

Injectors
Nathan Mfg. Co., 94 Liberty street, N. Y.
Wm. Sellers & Co., Philadelphia.

Inspectors
Pittsb. Test. Laboratory, Pittsb., Pa.

Inspectors of Bridges and My. Equipment
R. W. Hildreth & Co., 2 Wall St., N. Y.

Insurance
Hart. S. Boiler Insp. & Ins. Co., Hartford
Royal Ins. Co., 30 Wall street, N. Y.

Interlocking Switches & Signals
Allentown Rolling Mills, Allentown, Pa.
Hall Signal Co., 50 B'way, N. Y.
Kelsey R. R. Signal Co., Florence, Mass.
Nat. Switch & Signal Co., So. Bethlehem, Pa.
Union Switch & Signal Co., Pittsburgh.
Wharton R. R. Switch Co., Phila.

Iron—Taylor Yorkshire
B. M. Jones & Co., Boston, Mass.

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King Bridge Co., Cleveland, O.

Iron & Steel Ship Builders
Union Iron Works, San Francisco.

Jacks
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McSherry Mfg. Co., Dayton, O.
Richard Dudgeon, 24 Columbia St., N. Y.
Watson & Stillman, 210 E. 43d St., N. Y.

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D. A. Hopkins Mfg. Co., 143 Liberty St., N. Y.
Phosphor-Bronze Smelting Co., Philada.
Paul S. Reeves, Philadelphia, Pa.

Journal Bearings—Tubular
Mencely Bearing Co., W. Troy, N. Y.

Journal-Box Lids
Ramapo (N. Y.) Wheel & F'dry Co.

Lighting
Adams & Westlake Co., Chicago.
Railroad Lighting & Mfg. Co., Phila., Pa.
Safety Car Heat. & Light Co., 160 B'way.

Link Belting
Link Belt Eng. Co., Nicetown, Phila.

Lock Washers
Nat. Lock Washer Co., Newark N. J.

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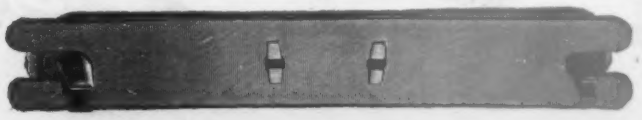

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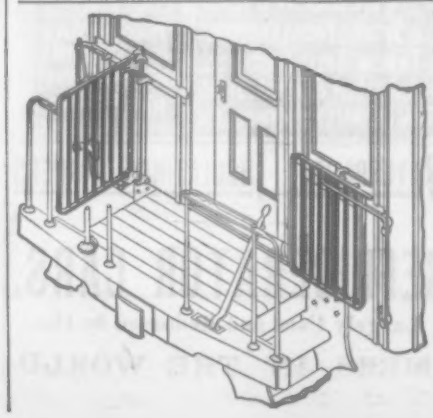

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Brooks Locomotive W'ks, Dunkirk, N.Y.
Cooke Loco. & Mach. Co., Paterson, N.J.
Dickson Mfg. Co., Scranton, Pa.
G. L. Fowler, 53 Broadway, N. Y.
Lima Machine Works, Lima, O.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.
Pittsburgh Loco. & Car W'ks, Pittsburgh.
H. K. Porter & Co., Pittsburgh, Pa.
Portland Co., Portland, Me.
Richmond (Va.) Loco. & Mach. Works.
Rogers Loc. & Mach. W'ks., Paterson, N.J.
Schenectady (N. Y.) Loco. Works.
Taft & Carlton, London, Eng.
Wharton R. R. Switch Co., Phila.

Locomotive Boiler Tubes.
Allison Mfg. Co., Philadelphia, Pa.

Locomotive Finishing Varnish
Flood & Conklin, Newark, N. J.

Locomotive Headlights
Adams & Westlake Co., Chicago.
Nat. Elect. Headlight Co., Indianapolis.

Locomotives, Second-Hand
Reginald Canning & Co., 115 B'way, N.Y.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.

Locomotive Staybolt Iron
Falls Hollow Staybolt Co., Cuyahoga Falls, O.

Lubricators
Detroit Lubricator Co., Detroit, Mich.
Nathan Mfg. Co., 92 Liberty street, N.Y.

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Bement, Miles & Co., Philadelphia, Pa.
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Gould & Eberhardt, Newark, N. J.
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Hayes Tool Co., Portland, Me.
Long & Allstatter Co., Hamilton, O.
Manning, Max. & Moore, 111 Liberty St.,
Morse Tw. Dr. & Mach. Co., N. Bed'd, Mass.
Newark Mach. Tool Wks., Newark, N. J.
Niles Tools Works, Hamilton, O.
Pedrick & Ayer, Philadelphia, Pa.
Geo. Place, 120 Broadway, N. Y.
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Wm. Sellers & Co., Philadelphia.
Stiles & Parker Press Co., Middletown, Conn.
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.
Universal Radial Drill Co., Cincinnati.
Watson & Stillman, 240 E. 43d St., N. Y.
Wharton R. R. Switch Co., Phila.

Malleable Iron Castings.
National Malleable Castings Co., Cleveland.

Mandrel Rolled Staybolt Iron
Falls Hollow Staybolt Co., Cuyahoga Falls, O.

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Union Iron Works, San Francisco.

Mop Wringer
Boston Wringer Co., Boston.

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Metcalf, Paul & Co., Pittsburgh, Pa.
National Lock Washer Co., Newark.
Ruffner & Dunn, Philadelphia, Pa.
Standard Nut Lock Co., N. Y.

Oil
Signal Oil Works, Ltd., Franklin, Pa.

Oil Cans
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Vulcan Iron Works, Chicago, Ill.

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Stow Mfg. Co., Binghamton, N. Y.

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Lehigh Valley R. R.
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Missouri Pacific.
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The American Harvey No. 1 Nut Lock, a resilient spring washer with chisel cutting edges. Patented. Tempered in oil.

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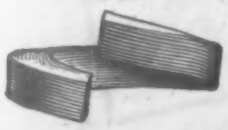

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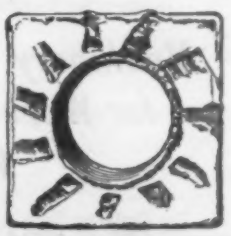
A Resilient Spiral Spring Washer with Rachet-Shaped Teeth.



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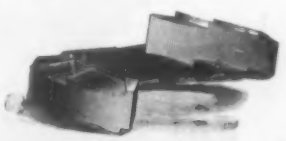

Our claim for this lock, aside from the unexcelled spring quality it possesses (being tempered in oil) is the tangential cutting or ratchet ribs on either side, and reversed, so that when the nut is set down these ribs are embedded in both fish plate and under face of nut to such extent that a removal of the nut by force (and it can only be done with force) will show annular grooves plowed on surface of both nut and fish plate (see cuts above) without disturbing the thread of either nut or bolt, both of which, together with the nut lock, can be used again. This is a positive lock, with spring temper, and will not cut thread of nut or bolt.

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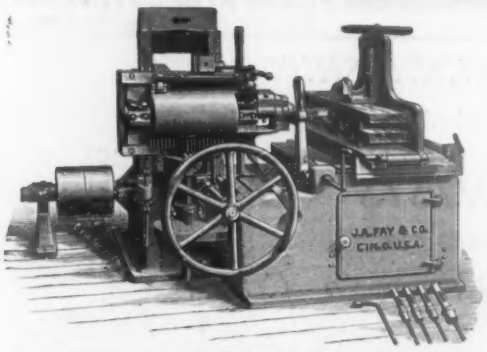

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Also, SEPARATE HEADS and DIES.

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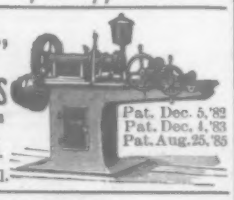

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Pat. Dec. 4, '83
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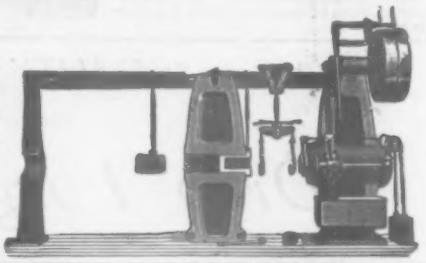

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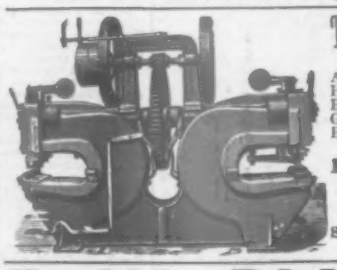

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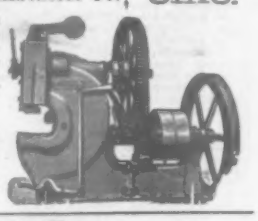

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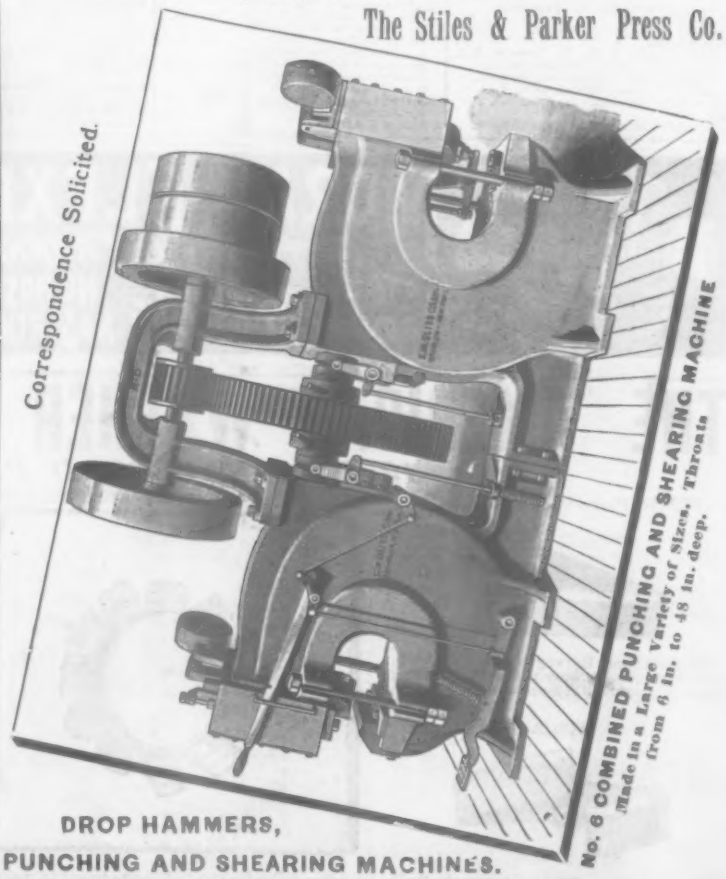
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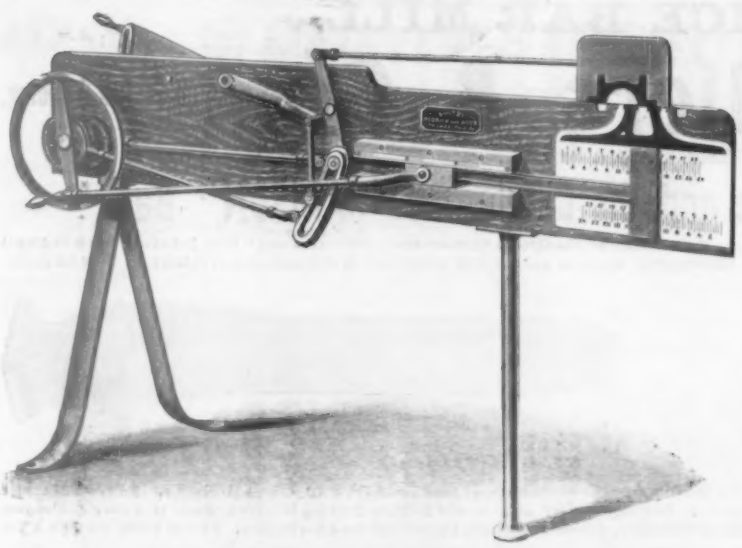

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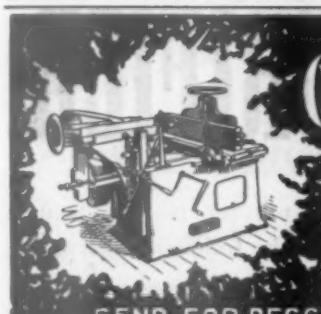

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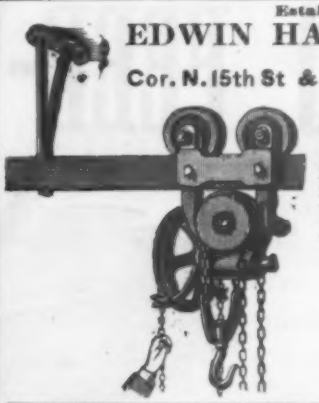

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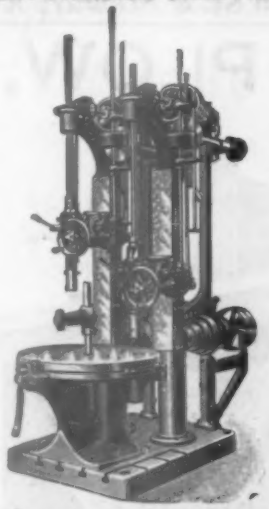

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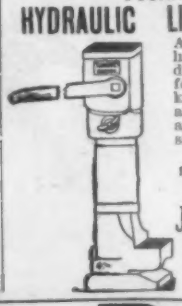

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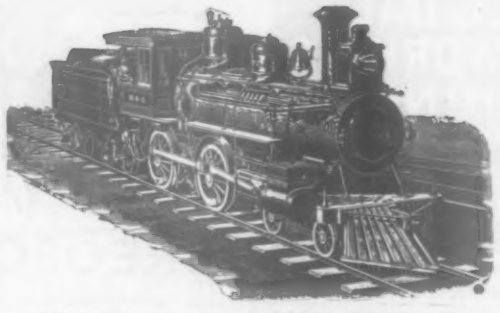

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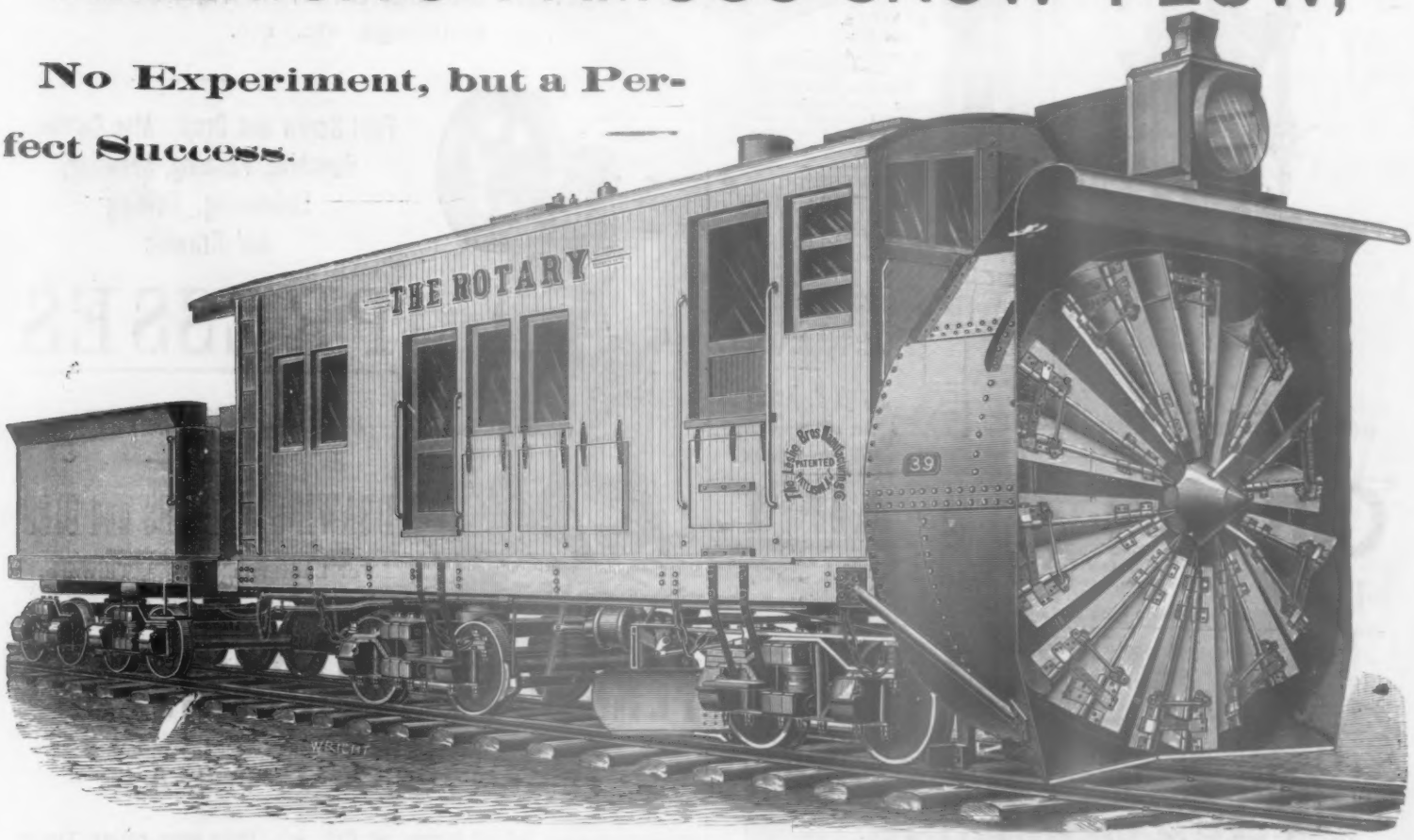

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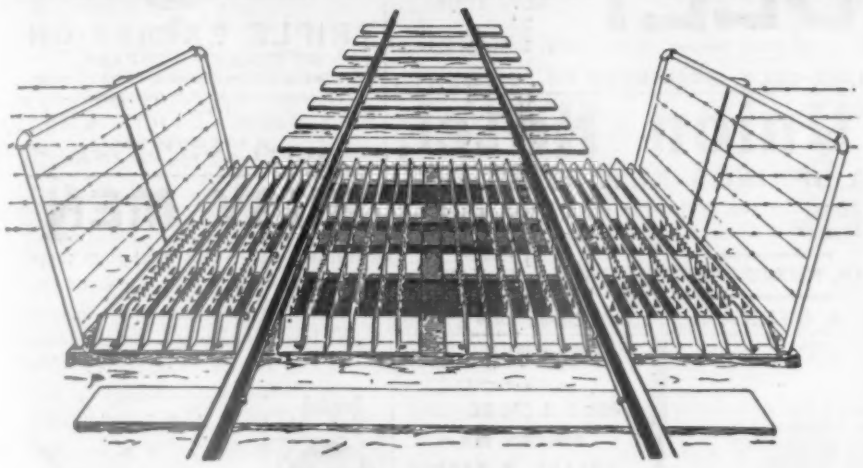

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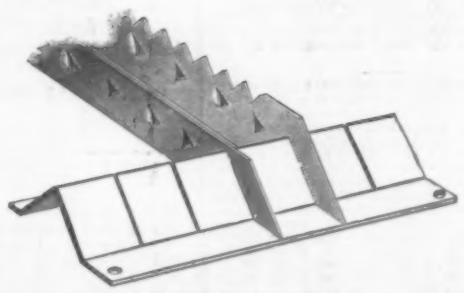

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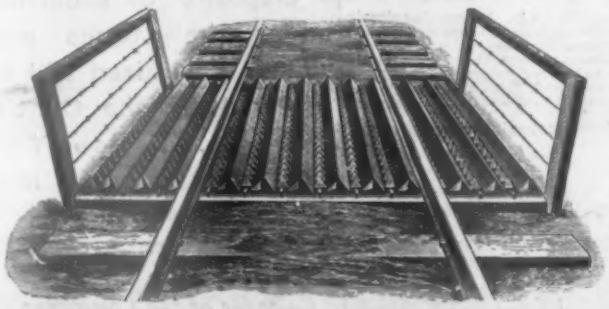

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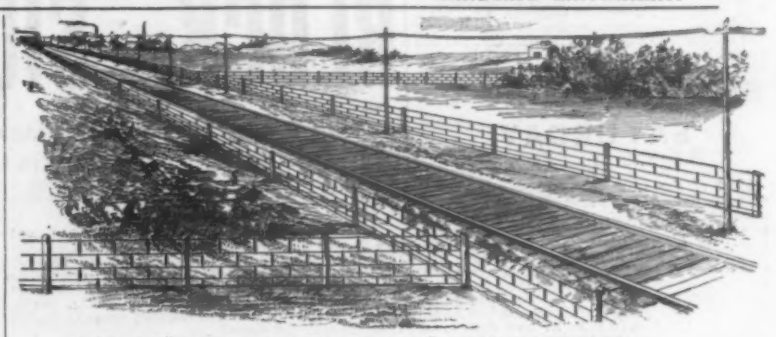

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THE SANITARY DISTRICT OF CHICAGO.

TO CONTRACTORS.

Sealed proposals addressed to the Board of Trustees of the Sanitary District of Chicago and indorsed:

PROPOSALS FOR EXCAVATING THE MAIN DRAINAGE CHANNEL will be received by the clerk of the said Sanitary District at Room H Rialto Building, Chicago, Ill., until 12 m. (standard time) of Wednesday, the 8th day of June, 1892, and will be publicly opened by the said Board of Trustees at the regular meeting held that day, or at a special meeting called for that purpose.

The work for which the said tenders are invited is the excavation of the main drainage channel for the said Sanitary District between Willow Springs and Joliet, Ill., and consists in all of about 11,500,000 cubic yards of rock, of about 5,000,000 cubic yards of earth, the building of 287,241 cubic yards of dry rubble walls, and 244,444 square yards of slope paving.

Bids will be received on three different propositions, designated as "Proposition 1," "Proposition 2," and "Proposition 3," respectively.

As provided under the different propositions said work will be divided into 14 to 17 sections, each of which will be treated as a separate contract in canvassing the proposals and making awards, except as otherwise provided in Proposition 3. As all awards will be made by individual sections or a group of sections, as provided in the specifications and forms of proposals to be furnished bidders, each bidder must make prices for each section, or a group of sections, as the case may be, separate and distinct from every other. The lumping of prices in any bid other than as given in the form of proposal under Proposition 3 will render such bid informal and will cause its rejection by the said Board of Trustees.

As the question of which proposition will be acted upon will not be determined by the Board of Trustees until after the time set for receiving proposals the bidder is allowed to make three alternative tenders based upon the terms of the specification for each of the three propositions respectively.

Each proposal must be accompanied by a certified check or cash to an amount equal to $3,000 multiplied by the number of sections bid upon, whether said sections stand singly or in a group. Provided, that the said check or cash shall entitle the bidder to make tender under any or all three of the said propositions.

All certified checks must be drawn on some responsible bank doing business in the city of Chicago and be made payable to the order of the Clerk of the Sanitary District of Chicago. Said amount of $3,000 for each section will be held by the Sanitary District until all of said proposals have been canvassed and contracts awarded and signed, the return of said check or cash being conditioned upon any bidder to whom an award of any portion of said work may be made appearing within 10 days after notice of such award being given, with bondsmen, and executing a contract with the Sanitary District for the section or sections of said work so awarded, and giving a bond satisfactory to the said Board of Trustees for the fulfillment of the same in the amount of $100,000 o reach section of work awarded him, whether said sections be awarded singly or in a group.

All proposals must be made on blank forms furnished by the Sanitary District and must give the price for each separate item of work. A form will be furnished for each of the three propositions.

The bids will be compared on the basis of the engineer's approximate estimate of quantities, which will be furnished with copies of the specifications.

No proposal will be considered unless the party making it shall furnish evidence satisfactory to the Board of Trustees of his ability to do the work, and that he has the necessary pecuniary resources to fulfill the conditions of the contract, provided such contract shall be awarded him.

Bidders are required to state in their proposals their individual names and places of residence in full.

Specifications may be had and plans may be seen at the office of the Chief Engineer, Room E Rialto Building, Chicago, Ill.

The said Board of Trustees reserve the right to reject any and all bids.

THE SANITARY DISTRICT OF CHICAGO,
By FRANK WENTER,
President of Its Board of Trustees.

Attest:
THOMAS F. JUDGE, Clerk.
Chicago, Ill., April 7, 1892.

Notice to Contractors.

Complete plans, profiles and specifications of The Sanitary District of Chicago, Ill., Main Drainage Channel can be seen at the office of the INGERSOLL-SERGEANT DRILL CO., 10 Park Place, New York.

EARLY CLOSING ON SATURDAY.

Most of the wholesale and retail firms in Chicago have decided to close their stores on Saturday at 1.00 P. M., commencing May 1st, in order to give their Clerks a much needed rest. In connection with this service the Wisconsin Central lines beg to announce that commencing May 1st, Excursion Tickets will be placed on sale to Lake Villa, Fox Lake, Antioch and Mukwonago. Trains leave the Grand Central Passenger Station at 8.00 A. M., 3.00 P. M., 4.25 P. M., 5.47 P. M. and 10.45 P. M. Returning trains arrive at Chicago at 7.15 A. M., 9.45 A. M., 9.50 A. M., 1.55 P. M., and 7.45 P. M.

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Remember this when figuring on a trip West.

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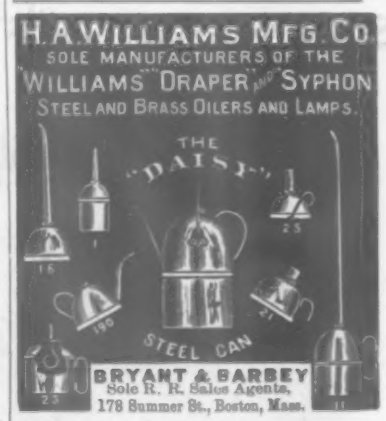
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Reorganization.

Deposits of securities under the terms previously advertised will be received by the Central Trust Co. of New York until and including May 16, 1892.

NEW YORK, MAY 6, 1892.

By order of the Committee,
G. S. ELLIS, Secretary.

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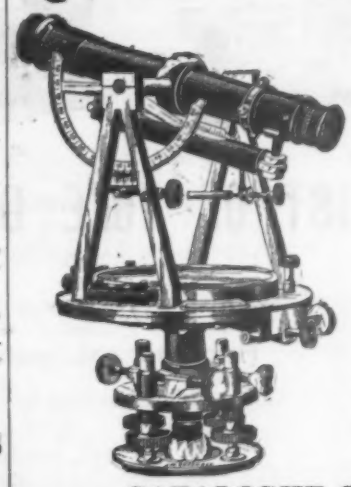

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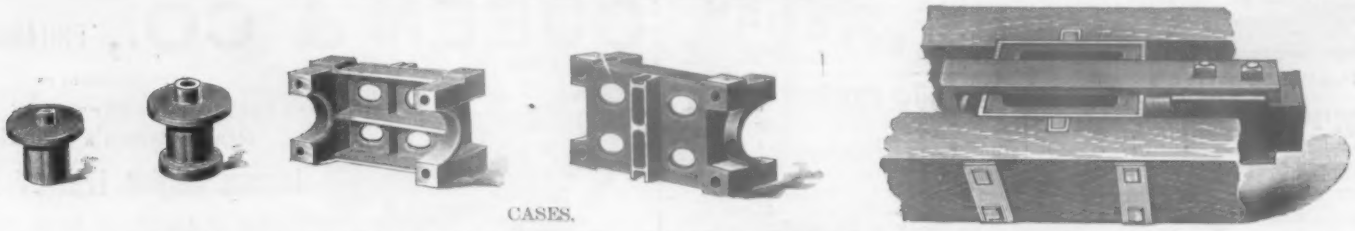

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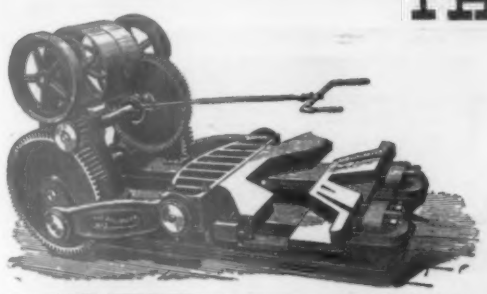

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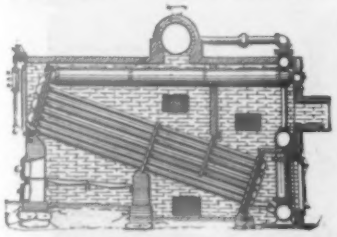

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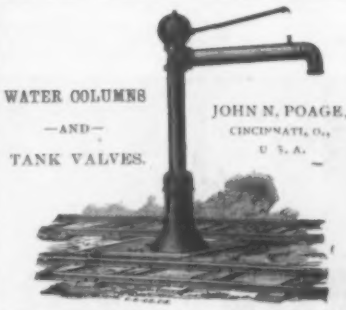

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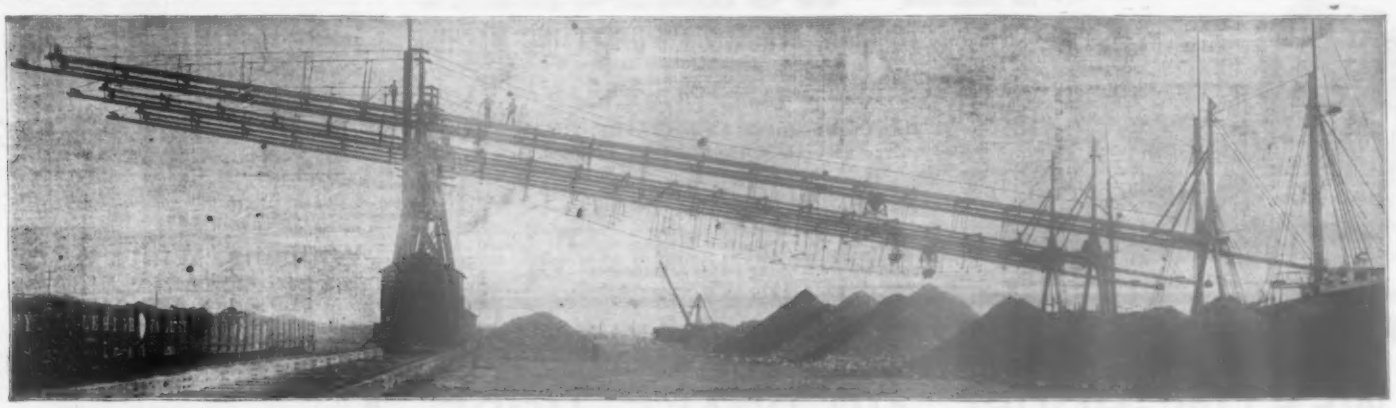

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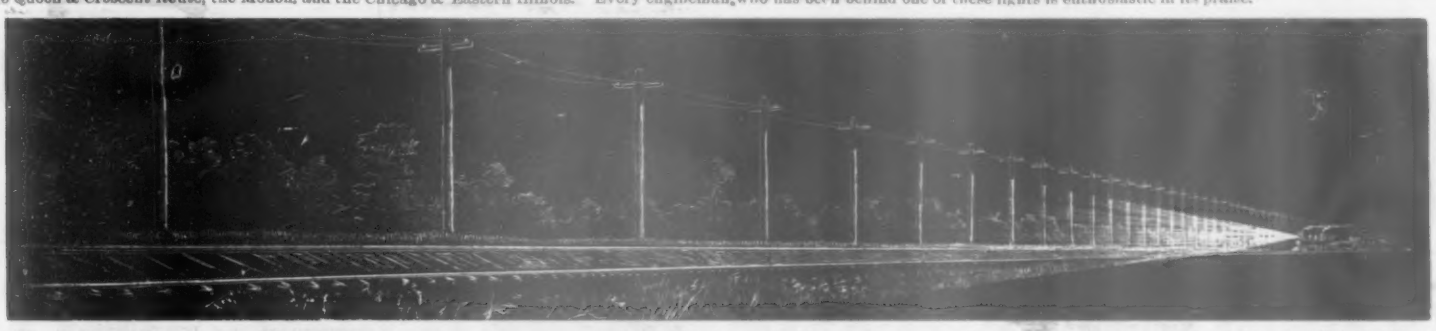

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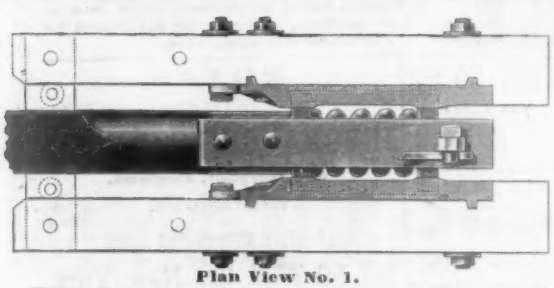
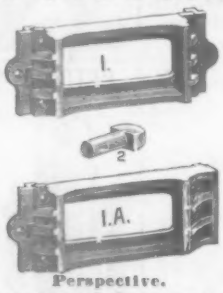
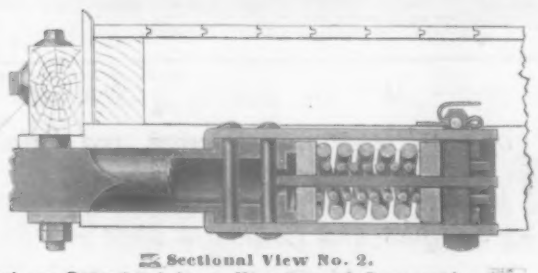


Plan View No. 1.



Perspective.



Sectional View No. 2.

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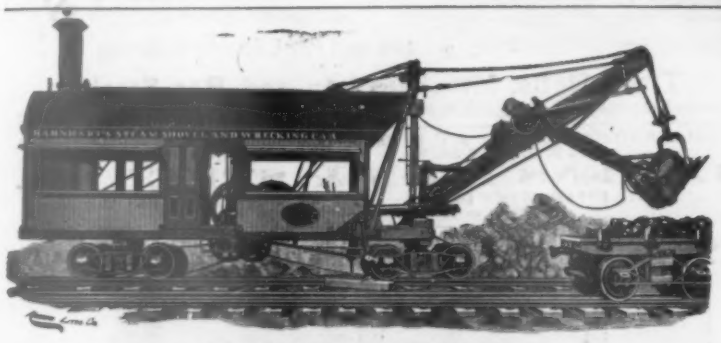

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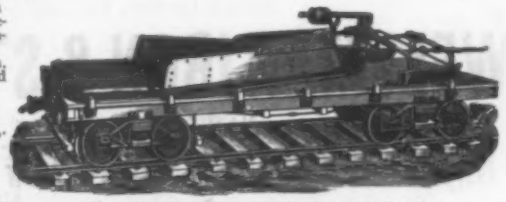

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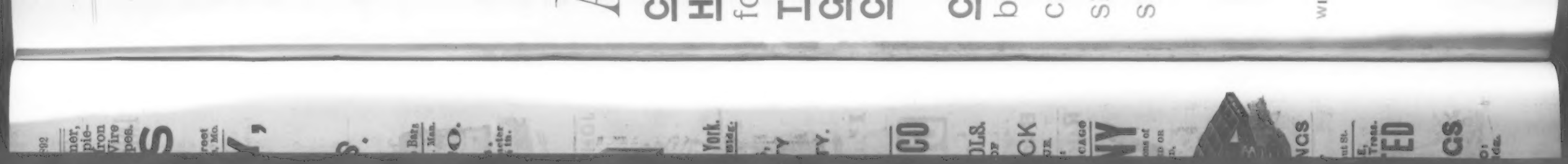

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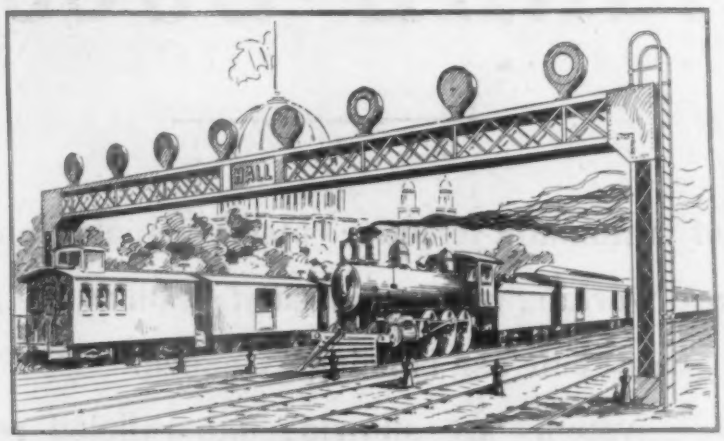

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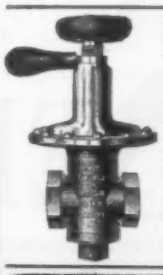

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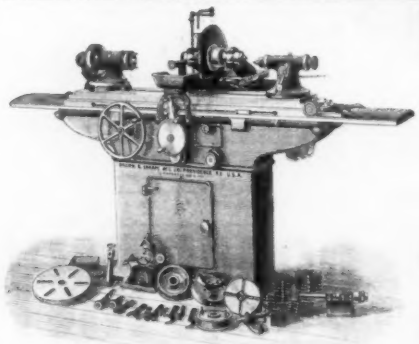

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RAILROAD GAZETTE

FRIDAY, MAY 13.

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Contributions.

Unlocking M. C. B. Couplers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A correspondent from Chicago attempts, in your issue of April 22, to criticise my last article on coupler legislation, and quotes what I say as to opening the knuckles by hand as follows: "And as the number increases the occasion even for this will grow less very fast because one knuckle is always left open when they are uncoupled."

He says this statement is true only within very narrow limits, and that it cannot be reduced below 50 per cent., and even if all cars were equipped with M. C. B. couplers and one knuckle is always left open, yet when the cars approach each other the chances are even that both will be closed. This is a contradiction that will need some explanation, and are there no chances that both may be open?

I presume from what follows that the gentleman is interested in some coupler that has a knuckle opening device, and although he asserts that there need be no sacrifice of simplicity, strength or fewer parts, I still maintain that there is, as was witnessed lately in a test of a coupler with a knuckle opener (to which a number of railroad men were invited); a knuckle was broken and failed to couple five times out of seven, and, if I am not mistaken, should the device be broken off close to the drawhead it would be impossible to unlock it.

In regard to the balance of the article, I would say that ridicule is not argument, and carries no weight with sensible men.

I will state here, as I am known to be connected with a prominent coupler, it might be thought that we have no method of opening the knuckle from the side of the car, but the fact is we have three, and hesitate to put any in use until it is demanded by the law, for the reasons given heretofore; also that any law compelling the use of a knuckle opener will be a dead letter, as the men will take the chances and open the knuckle by hand when it is necessary; whereas a law forbidding them to go between the cars while in motion would put the responsibility where it belongs. T. L. MCKEEN.

Uniform Locomotive Performance Sheets.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice the letter of "Justice" in your issue of the 29th ultimo in regard to comparative engine-performance sheets. Having had considerable experience in handling these comparisons, I would state that my results have shown that they are as valuable a method of comparing the working of engines on different divisions of a road, or of different roads in the same neighborhood, competing for the same conditions of traffic, as any statistics that can be got up in relation to railroad working. These comparisons should agree with the auditor's books, and be not got up in the hap-hazard way that has existed in the past.

Several reasons exist why locomotive performance sheets have not been regarded with the high degree of favor that they should.

First—The uncertain way in which they are sometimes made out, so that there is no particular check as to their accuracy.

Second—The fact that too many master mechanics are not skilled in the art (for an art it is) of making intelligent comparisons from tabulated statistics, and not allowed to have good enough office men to do the detail of this work for them.

Third—The feeling of semi-resentment that too often accompanies any comparison of the working of the department as regards its different divisions, or the showing of one road as compared with neighboring lines.

Fourth—A feeling that the "other fellow" is keeping his records in a different manner from the road in question, or is going so far as to make an unfair showing. In fact I have had it intimated to me when I asked a master mechanic for an explanation of the showing between his road and a neighboring line, that while the master mechanic of the other line might desire to make a fair showing, it was doubtful if his management would allow him to do so.

There is too apt to be a want of appreciation of what might be called the "commercial element" of their business on the part of master mechanics and a lack of recognition of the fact that the locomotive performance sheets can be made as accurate as any other part of the operating accounts which show the financial working of the road and should be one factor in the whole system of such accounts.

I am a full believer in the question of individual tests when research is needed as to the working of any special device, construction or method of engine operation, but in the working of the road as a whole it is the law of averages that we have to depend upon, as in any other railroad expense comparisons. My experience is that if master mechanics would take as much pains to see wherein their reports can be brought uniform with those of their neighbors, as they do sometimes in trying to prove the want of uniformity in such reports, and the uselessness of making comparisons, much good might be arrived at in the way of economy. An experience of over twenty years in watching matters connected with locomotive performance is that the locomotive reports well handled are efficient instruments to use in regulating and improving the character of operating the mechanical department. This method is at present being used successfully in one case we can refer to in bringing into line the working of the different locomotive divisions of a large system.

Though "Justice" refers mainly to the question of comparison between American and English locomotives in the different countries, yet it seems as if he was hardly willing to allow enough credit to properly compiled statements of engine performance. H.

[Perhaps the Committee on Locomotive Performance Sheets appointed by the Master Mechanics' Association at its last convention "to report on the practicability of establishing a system for recording the performance of locomotives that will fairly represent the work done," will offer such a system this year as will, when it is conscientiously followed, enable a comparison to be made of locomotive performance, on different roads under different conditions, that will be just to the motive power department, and furnish a safe guide for the betterment of locomotive rolling stock.—EDITOR RAILROAD GAZETTE.]

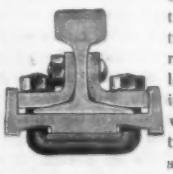
The Fisher Rail Joints.

TRENTON, N. J., May 10, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

If you will permit, I wish to correct what appear to me to be some misapprehensions in your remarks of April 29th concerning "Fisher" joints.

In the "triple fish" there is really a less number of parts, viz: three U-bolts, six nuts for them; two track bolts and two nuts; two upper fish bars and one lower bar, making a total of 16. While in the common six-bolt angle bar joint there are six trackbolts with six corresponding nuts, and six Verona nut locks which, with the two angle bars, is a total of 20 pieces, all separate when they come to the hands of the trackman, which must be put together and adjusted by him. But the difference in actual use is very much greater, for the reason that the "triple joint" is received as one complete. In laying new track it is only necessary to take out the two track bolts, slip the joint on one rail half its length to the central U-bolt, and then insert the other rail end to its position. Since the two U-bolts at the ends of the joint pass upward clear of the flanges, there is nothing to prevent both rail ends being entered as far as the central U-bolt. Nothing then remains to be done but to replace the two horizontal bolts and tighten up all nuts. They can thus be put on and secured in half the time required for the six-bolt, angle bar joint.



No "nut locks" are necessary, because there are no cross strains on any of the bolts, and with properly cut threads for bolts and nuts there is no more tendency to loosen than in a bridge or other permanent structure where all the stress is coincident with the axes of the bolts.

Your suggestion that all these bolt ends might be screwed up so tightly as to prevent movement of rails in expansion and cause danger of "buckling," is probably due to reported cases of such buckling with the six-bolt angle bars. Certainly, even with them, it must have been very rare, and only when they were exceptionally well fitted, and all surfaces in perfect parallelism, a condition possible only when new and unworn. But you overlook the fact that no such frictional force can be applied to the surfaces of the rail ends by the direct action of these bolts, though so much larger, as by the six horizontal bolts which, wedging against the four surfaces both under the heads and on the flanges for a length of 30 to 42 in. of the angle bar joint at an angle of 13 degrees, maintain a frictional resistance of *over four times* that if produced by direct strain of the six bolts—besides being more effective on account of the narrowness of surfaces engaged. Moreover, in the triple fish with its broad surfaces of direct contact it is not necessary to apply excessive pressure by these bolts. The rail ends are brought directly up to line with a force only about double that of any load and impact ever applied upon them, which is sufficient.

Regarding the Fisher "bridge" joint you are in error as to its making "no special provision for line." It is true that in the example quoted of that primitive six-inch suspension joint there was none except by the thin edges of the rail flanges against which the heels of the forelocks were supposed to fit. But the "bridge" joint has these forelocks extended inward to fit accurately against the lower part of the web on each side, so that by them the web is solidly "chocked" between the rigid flanges of the channel beam. When the U-bolt is screwed down therefore, it is impossible to move the heads out of "line" without bending or breaking the web of the rail; the wheel flanges would give way before that could happen. The accident of the surface of the bridge being "winding" does not occur in fact; these are rolled as true and as accurately as the rails themselves can be.

It must be admitted that your objection of the impracticability of connecting a long line of rails and then slipping them in all together has been a serious one with the "bridge" joint as heretofore arranged, and there is the additional one that to prevent "creeping" spike notches were necessary in the rail flanges. This is recognized and obviated in the latest form of that joint, with which you are probably not acquainted, as it has not yet been published or illustrated. I inclose sketch of this new "combination" bridge joint, from which you will see that more special provision has been made for "line" by extending the forelocks upward and against the web of the rail, sufficiently to permit the use of horizontal bolts through them and the inclosed webs of the rail ends. This also enables long lines of rails to be connected together before moving them into place; and there is no longer necessity for any spike notches in the rail flanges. CLARK FISHER.

Air Brakes on Mountain Grades.

CHICAGO, May 6, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Comparatively few people realize how much is required to get satisfactory air brake service on mountain grades The brake itself must be a model both in design and workmanship, and what is just as important, the engineer who handles it must be a man of knowledge and nerve. Every reader of the daily press knows that it is not an infrequent occurrence for an engineer to lose control of his train going down a heavy grade, but few understand how this can happen when the train is equipped with "air." The uninitiated do not know that there are brakes *and* brakes. To the average man an air brake is an unlimited stopping power that acts in some mysterious way, and which is liable to failure at unexpected times. Even many railroad officials do not know that one train equipped with air brakes may make a stop in less than half the distance required by another, to all appearances similar, and equipped with exactly the same kind of brake. This results from differences in load leverage, adjustment, pressure, grade, condition of rail, and direction and force of wind.

The railroad papers of late have had much to say about the competitive tests between the Westinghouse and New York air brakes. The Lansberg brake has also had a share of attention (almost entirely of a condemnatory nature), though the latter should not be put in the same class as the first two, its action is so exceedingly erratic. A committee of the Master Car Builders' Association, appointed to formulate a standard of efficiency for power brakes, has submitted suggestions for discussion. One of the most important of the tests incorporated in the report is that referring to graduation or service stop applications. Where the emergency feature of the brake is used once, the service application is used an indefinite number of times. It is the latter class of service that must be depended on in descending mountain grades, and unless the valve works satisfactorily in such service, it must be considered a failure regardless of how perfect the quick action may be.

The first instructions to an engineer in regard to the use of his brake on a grade are: "Do not waste air by unnecessarily heavy or frequent applications. Every release means a loss of air. Try to maintain a uniform speed, not letting it exceed a reasonable limit.

"If the train gains speed more rapidly than you think

desirable, do not get excited and put on all your braking power at once, but gradually add to the application until you have regained control.

"Last, but by no means least, if you find that you have checked the speed more than was your intention, *do not be in a hurry to release*, but keep the brake set until you are sure you will have ample time to fully recharge the car reservoirs before the train will have regained such speed as to require a resetting of the brake. Neglect of this instruction is almost sure to result in a 'runaway.'"

It will be seen from the above, that to insure *safety* and *speed* on heavy grades it is necessary that the engineer have perfect control over his brake. A certain reduction should give a definite amount of pressure in the brake cylinders, which pressure should remain constant, neither increasing nor diminishing, except through manipulation of the engineer's valve. This requires that the graduation feature of the triple valve should work sensitively and still be perfectly tight. Where this is not the case, there is danger, first that the pressure in the cylinder will increase beyond what was desired by the engineer, and second that this will so reduce the auxiliary reservoir pressure as to finally release the brake when it should stay set; resulting in a great waste of air and extreme variations in speed. Even the Westinghouse brake can scarcely be considered perfect for this service as the engineer is in a measure dependent on the brakeman for control of the release through the pressure-retaining valves. While he may *apply* the brake with any degree of pressure desired he cannot release it, and then stop the exhaust where he chooses.

A number of devices have been patented with this idea in view, but they all more or less add complication to a system already about as intricate as can be made reliable in practical service. Among these devices may be mentioned several systems with double train pipes, one for application and one for release, and a number of triple valve mechanisms, embodying what might be called a graduated or partial release valve, regulated similarly to the service stop part of the triple valve now in general use. One of the former (or double train pipe class) was patented by Westinghouse in 1881, and several of the latter by T. S. E. Dixon, of Chicago, in 1888 and 1889. The writer even now questions whether the Westinghouse double train pipe of '81 is not a better plan than the rather uncertain pressure retaining valve, the control of which is not in the hands of the engineer. One probable reason for not using it may have been the introduction of the air signal, which with the arrangement under discussion would have made three air hose couplings between each car, and this would be likely to lead to confusion. The brake as it is used to-day is quite safe and satisfactory for mountain service, provided of course that the engineer and train crew are properly posted, but if brakes are allowed to come into practical service without having satisfactorily demonstrated their reliability in graduation applications and down grade work, then this safe condition may become an exceedingly dangerous one.

PAUL SYNNESTVEDT.

Color and Form for Night Signals.

BOSTON, May 3, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is a well-known fact that the most useful, patient and, at the same time, most abused men in the world are editors and railroad men, who toil and plod day and, night for the benefit of the millions, with scarcely any appreciation of the benefits which they alike confer upon the public. This thought struck me in your own case, Mr. Editor, upon reperusing the columns of the *Gazette*, in which for the past two or three years you have faithfully and diligently labored to impress upon railroad men the importance, not only of a consistent system of signaling, but of adopting correct fundamental principles in the installation of the same. Notwithstanding all this, now that the subject is beginning to receive the attention which it long ago deserved, we are in danger of that very confusion and crudeness, born of expediency, inexperience, or a desire to set the pace for others, which your educational efforts have endeavored to prevent, and in all good conscience ought to have prevented.

Your issue of April 15 last brings to the front again the old question, as to what scheme of lights for night signals ought to be adopted. Your correspondent, "S. F. T." (see page 275) has very clearly stated the two difficulties that have proved to be two more or less hungry and bold lions in the way of progress toward a rational, uniform and satisfactory practice. Your editorial on page 283 is worthy of more than one reading (and in this respect I practice what I preach); also I well remember your previous article on the same subject in your issue of Jan. 2, 1891 (perhaps *that* was written when your new resolutions were fresh and strong); and it was after reading a signal engineer's communication suggested by your editorial, published in your issue of Jan. 9, 1891, that I ventured to write you on the same subject (see page 37 of your issue of Jan. 16, 1891, also corrections on page 55 of the next issue). The example of some of the leading roads running out of Chicago, in radically changing the color scheme of signals and discarding form signals, shows how the question is likely to be met when the exigency of the anticipated rush to the World's Fair next year is under consideration. With the fear of repeating what I had written in the communication above referred to (which, however, I suppose is good editorial practice), I will, with my humble weapons, dare to attack the two lions in the way; and these are (referring to the article of "S. F. T."): *First*, a white light for safety is too easily confused with other white lights, either on the railroad or near it. *Second*, the breaking of colored glass may turn the caution or danger signal into a safety signal.

(1) Recognizing that the first lion is much the bigger of the two, we may dispose of the little one first, although what *he* lacks in size he makes up in ferocity and capacity for doing damage. It must be admitted that it is the rarest thing in the world for such a thing to happen as the breakage of colored glass causing any accident through falsifying the signal; but we must not take shelter under this refuge. Consistency demands perfection, and though we may admit that the probability of trouble is reduced to the smallest dimensions, we must, nevertheless, from our lofty standpoint, use white where it can do no harm when the glass *does* break.

Our consistent scheme of signals will, therefore, stand as follows: Safety, green; caution, red; danger, white. For, if we use green for "all clear" we must use red for caution and not white, because if red is to mean danger and white caution, then, when the accidental breakage occurs, our engineman has liberty to pass what really was a danger signal at such speed as he, in his good judgment, might think a caution signal would permit, and this would be inconsistent. This forces us to eliminate white altogether in railroad signaling, but as we must clearly indicate three widely different ideas, namely, "proceed at speed," "go slow," and "stop," we must find another color beside green and red. Exit white, therefore, and enter the solar spectrum—red, green, blue, violet, purple (orange and yellow having too much "white blood," are left out of this new aristocracy). Blue might answer for our new color, if it were practical to get as much difference between our lights as there is between blue sky and green lawn, but it is doubtful if the glass-maker can accomplish this for us. As for purple, it is simply a deep shade of blue with a tinge of red, while in violet the red predominates over the blue, and both are confusion colors. Probably no better scheme could be devised, if white is to be abolished, than green for safety, violet for caution and red for danger, although even then there would be more or less ground for anxiety, for fear that under certain conditions of atmosphere and storm, or perhaps in the eyes of the engineer (even though tested for color blindness), the difference between "all clear" and "caution" would be less emphatic than it now is. We shall also have to contend with the fact of the three colors selected for our scheme, "all clear," cannot be seen as far as "danger," while "caution" will be weaker than either of the others (one objection that I should raise to green for an "*all clear*" signal is that it is poorly seen at a distance).

(2) As to the trouble in using white for "all clear," on account of the danger of confusing it with non-signal lights which may happen to be within the range of the engineman's eye at or about the place where he expects to find a signal, the danger in this case comes from the added condition that the signal-lamp (which should show either red or green) is not lighted at all, thus allowing a foreign white light to be mistaken for it, with, as might be expected, disastrous consequences. This, too, must be considered as a rare phenomenon, although not so rare as the one first mentioned, by any means. But the principal difficulty, no doubt, is found in the case where the route lies through, or contiguous to, a complicated yard where there are a multitude of railroad signals, surrounded also by a large number of town and street lights, which not only create confusion, but greatly increase the nervous strain of the engineer in his effort to be sure of his route. As you well remarked in your editorial comments, a *form* signal can be indicated by using more than one lamp, but this rather increases than lessens the difficulty, under the circumstances just mentioned, if the added lights are to be white. Now, if we really wish to be consistent and not allow our pocket-book to monkey with our principles, then by placing at the top of each signal-post a permanent colored light, green, blue or violet, which at night time should show the engineer that he is approaching a semaphore signal and that the light in close juxtaposition with the marker or index light is the one by which he is to be governed, whether it be red, green or white, I think it might be an improvement over the present system of night signals.

(3) But to rely wholly upon color is really taking a step backward, for there can be no question but that a clearer, more unmistakable and more quickly comprehended signal can be made by *form* than by any arrangement of colors, and this is based upon psychological reasons. The forms of natural objects are instantaneously recognized, and that without any mental effort; but when *colors* are to be distinguished (not merely seen), the faculties of judgment and comparison must be exercised, and there must be, to a greater or less extent, a balancing of impressions before the decision is fixed. In other words, an object is first *seen*, next its colors and various other markings and shadings are noted, compared and pronounced upon.

I am almost afraid, Mr. Editor, that my crude weapons have proved insufficient to lay in the dust the two lions that threaten the destruction of our white-light signal, but I will say that I do know of a bright and shining sword that *is* capable of speedily putting an end to both of them; and if we are really studying consistency, and not expediency, I would like to have the reason stated why we should abandon form as a night-signal when it is capable of being so successfully used, and that, too, in combination with the very colors which have hitherto been used and which are sanctioned by the standard code of rules adopted by the American Railway Association and put in force on a very large number of roads throughout the country. That code provides that white should be used for safety, green for caution, and red for danger, and I am going to give my own opinion that this scheme of colors is the most obvious and natural that could be adopted. The pure and far-reaching white *ought* to mean safety; the mild and judicious green *ought* to mean caution; while the blood-like and fiery red *ought* to mean danger. These colors are most widely differentiated from each other, as are also the ideas which they symbolize; for blue is too near green and violet too near red to be thoroughly trusted under all conditions of practice.

When, therefore, I take my sword in hand, I know you will at once recognize it as the illuminated semaphore,—the Koyl blade as it is called, which uses the principal of the parabola, whereby the rays of light are intensified and made to cover evenly a large extent of surface. For two years I have been using these semaphore signals. They are beautifully clear, consistent, distinctive, and in every way satisfactory. *They are particularly distinctive at night*, and although surrounded by electric lights, some in the same yard with the signals, as well as by house and street lights, there has never been the slightest difficulty in knowing exactly what their meaning was. As they are most emphatically form or position signals, color is of secondary importance; thus if a horizontal red signal, through breakage of glass (which has never happened), should show white, it would still be a horizontal danger signal, and the same would be true of the green caution signal; it would simply show a white horizontal signal; but, in such case, the engineman would know at once that the color glass merely had broken, and that the signal meaning (according as he finds it a distant or home post) remains unchanged. The illuminated blade also gives what is rightly held to be the most correct practice, namely a clear and unmistakable safety signal as the necessary condition of proceeding; that is to say, no train can pass a signal unless the inclined position of the semaphore, whether by day or by night, is distinctly recognized. There are no apologies to be made, no exceptions to be stated and no confusion to be explained.

The writer firmly believes that the needed further improvement in the way of simplification and cheapening of *form signals*, stated in the conclusion of your editorial, will be soon realized. Now, if this can be accomplished and the cost of such semaphore signals be brought, as the saying is, "within the reach of all," can anything be conceived of that would better fulfill the cardinal conditions of good signaling, and at the same time secure a thorough uniformity in principles, than the adoption of the illuminated semaphore as a standard signal? Your correspondent stated that he hoped his paper might lead to a general discussion of the subject, and I sincerely trust his wish may be gratified. As I said before, I can but think that the Chicago roads are leading us backward and not forward, so far as signaling is concerned; and I say this with a thorough appreciation of the ingenuity that has been displayed by Mr. Carter, of the Northwestern road, in his arrangement of semaphore lights illustrated in your issue of May 8, 1891. In this connection, mention should have been made of the additional factor in American signal practice which the introduction of electrical appliances has brought out, and which has given such an impetus to the "banjo" signal; but I forbear trespassing further at this time upon your space.

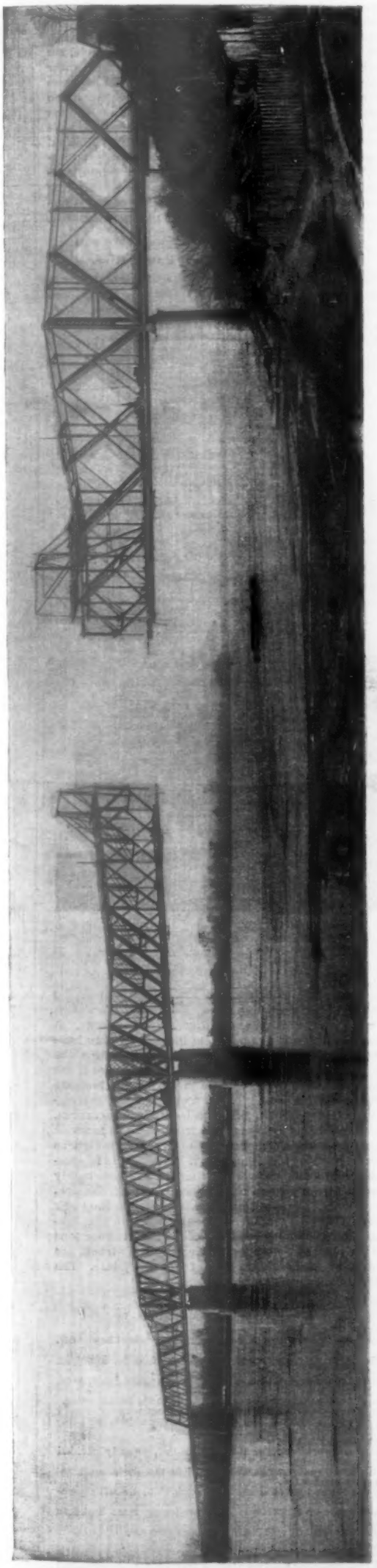
C. A. HAMMOND.

Opening of the Memphis Bridge.

The official opening of the Memphis Bridge takes place as we go to press. According to the programme a great three days' celebration has been arranged. On Wednesday, the 11th, delegates to a Deep Water Convention were to assemble, and on the 12th the ceremonies of the opening of the bridge were to take place. On the 13th, according to the programme, there were to be sessions of the Deep Water Convention, with fireworks and banquet in the evening. A great many distinguished people have been invited from various parts of the United States.

In our issue of June 26, 1891, there appeared a pretty circumstantial account of this bridge, a considerable part of which we reprint.

The bridge is building by the Kansas City & Memphis Railway & Bridge Co., and will serve the allied companies, the Kansas City, Fort Scott & Memphis and the Kansas City, Memphis & Birmingham, giving an unbroken rail line from Kansas City to Birmingham. It will also serve the St. Louis, Iron Mountain & Southern and the Little Rock & Memphis, as well as the roads which reach Memphis from the East, all of which now transfer cars by the ferry. It is the only bridge across the Mississippi below St. Louis. It lies at the converging point of a number of railroads, and is on the line of great industrial and traffic development. It may reasonably be supposed, therefore, that it can earn enough to pay a fair interest on its cost.



March 28, 1892.

The bridge proper consists of five spans, as follows:

	Feet.
Eastern shore span	225.83
Main span	790.42
Two river spans, each 621.06 ft.	1,242.12
Western shore span	338.75
Total	2,597.12

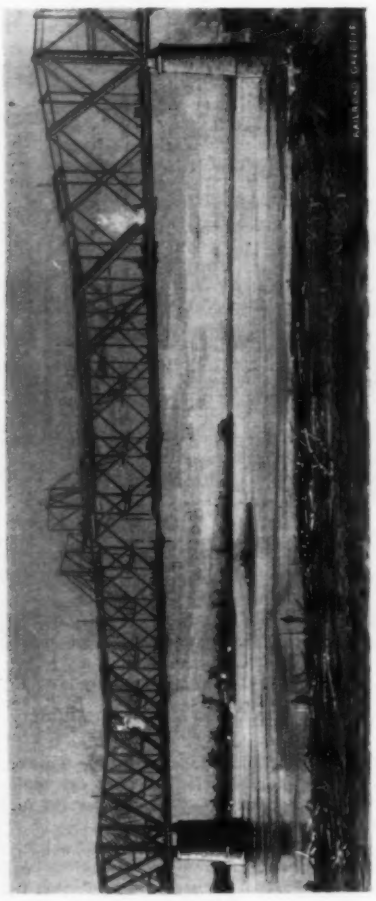
The western approach will be a viaduct of 49 plate girder spans on Z-iron columns, resting on small piers on pile foundations.

The bridge is of the cantilever type, as follows: Eastern shore span, cantilever arm, 225.83; main span, two cantilever arms, each 169.38 ft., and intermediate span, 451.66 ft.; one continuous truss span, 621.06 ft.; one span made up of a cantilever arm, 169.38 ft., and a span with parallel chord trusses, 451.66 ft. long, one end hung from the cantilever and one resting on a pier; one deck span, 338.75 ft. The trusses are spaced 30 ft. centres, but the portals will not admit of two tracks. The greatest height of trusses is 77 ft. 7½ in. from centre to centre of pins.

There are but two bridges in the world with longer trussed spans than this, the Forth and the Sukkur bridges. The longest trussed spans now in existence are:

	Feet.
Forth, two spans, each	1,710
" " " "	690
Lansdowne (Sukkur, India) one span	820
Memphis, one span	790.4
" two spans, each	621
Colorado River (Red Rock), one span	660

The superstructure of the Memphis bridge is entirely of steel except the nuts, swivels, clevises and wall pedestal plates. The pedestal plates are of cast iron and the other parts mentioned may be of wrought iron.



East Intermediate Span—April 9, 1892.

KANSAS CITY & MEMPHIS RAILWAY AND BRIDGE CO.—GEORGE S. MORISON, *Chief Engineer.*

THE MEMPHIS BRIDGE.

The river piers—five in number—are sunk to depths varying from 78 to 131 ft. below high water. They were all sunk by pneumatic caissons and are of masonry from the caissons to the bridge seats. The heights of the various caissons run from 40 to 80 ft. and of the masonry piers from 93 to 158 ft.

The foundations were put in by the Bridge Company under the immediate designs and superintendence of Chief Engineer, Mr. George S. Morison, and the Resident Engineer Mr. Alfred Noble. The deepest foundation is 130.8 ft. below high water, and the greatest depth below the water surface reached with this pier during building was 108 ft. This, we believe, is the greatest depth at which the pneumatic process has ever been worked, except the eastern abutment of the Eads St. Louis bridge. This latter is 135.5 ft. below high water and the greatest immersion was 109.7 ft. In the Memphis bridge foundations, at the greatest immersion, the air pressure carried was 47 lbs. At this pressure the men worked in shifts 40 minutes, each man working three shifts in the 24 hours. We give below a table of a few of the deepest foundations in the world. The "greatest immersion" is while work in the caissons was in progress.

Sunk by Open Dredging.

	Below L. W. Ft.	Below H. W. Ft.
Dufferin (Benares)	140.5	190
Hawkesbury	153	160
Poughkeepsie	132	135

Sunk by Pneumatic Caissons.

	Below L. W. Ft.	Below H. W. Ft.	Greatest Immersion. Ft.
Memphis	96.2	13 .8	108
Eads, St. Louis	94	135.5	109.7

The reader will probably remember the description in our account published in February, 1890, of the use of mattresses in sinking the caissons. This device was, we believe, entirely new and original on this work. The bed of the river for a depth of from 40 to 50 ft. is coarse sand. In order to prevent scouring before the caissons could be grounded, the river bed under each caisson was carpeted with a mattress 240 × 400 ft. in dimensions. These mattresses were made of willows or other brush, woven together and bound by wire. These were anchored over the pier sites, loaded with stone and sunk. The caissons were then sunk on these mattresses, and, of course, the mattresses and loose stone were cut through to allow the caissons to sink to the clay. This expedient is said to have been very successful, as the caissons were sunk without any tilting out of level and with no trouble whatever from scour. On the mattresses which remain in position rip-rap is placed to prevent scour around the piers. The caissons rest on a very thick stratum of clay. It is the stratum which underlies Memphis and from below which the water supply of that city is taken by artesian wells.

The erection was done by Messrs. Baird Brothers. The members were handled in the usual method by hoisting engines, of which there were two in use, one with eight winding spools and one with six. They were the Mundy engines, which are familiar to those of our readers who are interested in work of this kind.

It is difficult to realize the immense proportions of the parts of the superstructure without seeing them. Drawings or figures convey but little idea. The main posts of the cantilever trusses are 80 ft. high and weigh about 28 tons. The main pin is 14 in. in diameter, of steel, and weighs 2,300 lbs. The steel pins at the panel points in the lower chords are 7.0 in. in diameter. For handling these immense masses no novel methods have been introduced; the erecting is simply a development of the methods long used by American bridge builders. The field riveting of the lower chords is done by pneumatic riveters designed by Mr. Morison.

The erection of the superstructure began late in February, 1891. In July of that year the false works for the central span were begun and the erection of the superstructure of this span was begun in September; Oct. 15 it was swung clear. The bridge was connected through April 6, 1892; that is, a little over a year and a month after the erection of the superstructure began and three years and nearly five months after the beginning of the building of the first caisson. The material for the superstructure of the bridge was furnished by the Union Bridge Co. and A. & P. Roberts & Co., and the material for the viaduct was furnished by the Pennsylvania Steel Co. and Cofrode & Saylor.

The Standard Code on the Southern Pacific.

General Superintendent J. A. Fillmore, of the Pacific System of the Southern Pacific Co., has issued a new book of train rules, based on the standard code, to go into effect July 1. We give herewith the principal points in which this varies from the standard code, and subjoin a brief account of the additional or non-standard rules.

The "General Notice" contains a long paragraph warning employés against the dangers of their occupation. Rule 4 *a* says that "No employé will be permitted to continue in the train service without passing a satisfactory examination on these rules." Rule 9 has a special paragraph referring to enginemen and firemen "after they cross the turntable." The standard time rules have slight additions, which seem to be good. Each station has to give O K after receiving standard time at noon. Rule 18 requires work train conductors to state on their car report with whom they compared their watches.

Rule 19 forbids conductors and enginemen to run without a copy of the time-table, and gives directions to superintendents about issuing new tables. Rule 20 is followed by these:

a. Trains of numbers not represented on the new time-table, and trains of which the new time is later than the old, will report and obtain orders before the new time-table takes effect. *b*. All trains appearing on a new time-table, which were not shown on the previous time-table must be regarded as being on the road from the time the new time table takes effect, except in cases where the time of such a train at its originating point is earlier than the time at which new time-tables takes effect; in such cases the train will not run on the date on which the new time-table takes effect.

Rule 22 says that no signs will be placed opposite the figures of freight trains. Way freights must stop at each siding or make sure that there is no work to do there. All trains running in a direction from San Francisco will be called eastbound, regardless of the points of the compass, and vice versa. Rule 31, describing fusees, is omitted. Rule 34 *a* requires passenger trains to display two lights "and a red light on centre of platform"; freight trains must show a cupola light (color not stated). Rule 37 uses the word "irregular" in place of "extra." Rule 37 *b* requires engines running backward to display signals in the same potition on the engine as when running forward. Rule 38 *b* is as follows:

A blue signal will also be used at night by car inspectors when examining the automatic brakes to signal the engineman from the rear of the train to apply or release the brakes, the stop signal meaning apply, and go ahead signal meaning release.

Rule 42 *a* commands prompt use of the two short blasts, and 42 *b* prescribes the use of this signal three times in succession to signify that brakes are sticking. Rule 47 *a* prescribes three short blasts, repeated once, as a whistle signal to be given before passing under tunnels, snowsheds and bridges, to warn the men on the train. Rule 48 *a* requires trains to stop if their whistle signals are not properly answered. The highway crossing signal (rule 49) must be sounded frequently by irregular trains at obscure places, and during fogs or snowstorms. Bell cord signals (rules 51, 53 and 55) must not

be used by conductors except in emergencies. Rule 73 requires the light to be over the centre of the track. Rule 74 *a* provides that where two or more trains take a siding the last conductor shall say when the headlight (of the foremost) is to be covered. Rule 75 *a* enjoins careful attention to any signal at a flag station, and prohibits the use of red lights for ordinary stoppages (where there is no danger). Rule 89 *a* has a condition which will probably do more harm than good. It attempts to enjoin extra caution on men running sections of freight trains, ignoring the fact that two such trains bear precisely the same relation to each other, as regards this rule, as two which do not bear the same number. Rule 94 is omitted, and 94 *a* substituted for it. There is no difference in principle, however. This rule is of doubtful value in a general code, because the subject generally has to be taken up again on the time-table. Rule 94 *c* requires that all trains must approach the limits of established yards under full control; 94 *d* requires enginemen to try the air brakes a mile from drawbridges, crossings, junctions, meeting points and established yards. Rule 95 *a* requires conductors to go in person to the telegraph office at terminals, and prescribes the manner of registering. 95 *b* authorizes yard engines to work within their limits day and night, keeping out of the way of regular trains; but when trains are due they must be "under proper protection." In view of the provision made by rule 94 *c*, the nature of this protection would seem to be left to the discretion of the conductor.

Rule 99 gives the distances by rail lengths as, "one-half mile, 90 rails or 15 telegraph poles." Rule 99 *a* requires a train to be started when the flagman is recalled, unless there is a clear view for one-half a mile; 99 *b* requires a flagman to avoid stopping on a curve; 99 *c* requires an engineman who takes up a flagman to run under control to the first side track.

Rule 99 *d* is as follows:

In case a train under danger signals or flag meets another train on the main track, such action must be taken by both as will cause the least delay to the train having the right of track. By running under danger signals or under flag is meant to always run with caution, and when the train is within not less than one-half mile of any point where the view of the track is obstructed it shall be stopped, and remain standing until a flagman sent ahead disappears from view at the point before mentioned. It may then proceed at a speed not greater than five miles per hour, until the obscure places are passed, when it may overtake and pick up the flagman, and proceed until the next obstruction to view is met. Looking out for danger at curves and obscure places from a position on the engine or train *is not flagging* and will not be tolerated as such.

Rule 107 is followed by 107 *a*, which is the same as the last sentence of rule 523, though the phraseology is improved. It says, "Orders are *to be considered as* annulled." Rule 110 *a* permits one train to flag another to the next telegraph station. Rule 113 *a* fixes the hours of work trains from 5:30 a. m. to 7 p. m.; they may work till freight trains approach, when properly protected.

In carrying out rule 114 trains must be brought to a full stop, if necessary to avoid accidents. Rule 115 calls attention to rule 50, but why, is not clear. Rule 117 is followed by three supplementary rules. Station men are held responsible for switches. Rule 118, with its supplements, fills two pages. Conductors are instructed in considerable detail to be cautious in case of rain storms, high water, etc.

Rule 122 provides for temporary rules on time tables, and we then jump to rule 200, which begins the "Special Instructions," though why they are called special is not very clear. There are 138 of these. The first 104 are headed "All employés," but they embrace a good many rules which apply only to certain classes. Rules 304 to 337, inclusive, are for trackmen, bridgemen and watchmen.

Rule 200 prohibits the use of intoxicating drinks, and states that "total abstinence in this particular, as well as in the use of opium and other narcotic drugs, is necessary to safety." All employés are forbidden to smoke when among passengers at stations while on duty.

Rule 211 forbids testimonials to superiors, and those in authority must not accept presents or testimonials. Conductors are ordered to cut trains to avoid obstructing highway crossings if they stop more than *ten* minutes. Where trains have to "saw by" the senior conductor will take full charge. Persons in charge of stock must not ride on freight cars. When they are near the forward portion of the train, the conductor must notify them before starting, so that they can get into the caboose. Loaded freight cars must be *locked* and sealed.

We have noted the more important peculiarities observed in glancing through these "intermediate" rules. In general, they seem to have been compiled with care though they have the common fault of embracing some subjects already covered in the standard portion of the code, and some of them have the old fault of enjoining certain things which are sure to be neglected, and prohibiting certain things that are sure to be done, in spite of the rules. The number of things to be reported to the superintendent by wire is so large that if the rules are carried out the telegraph operators must be kept pretty busy.

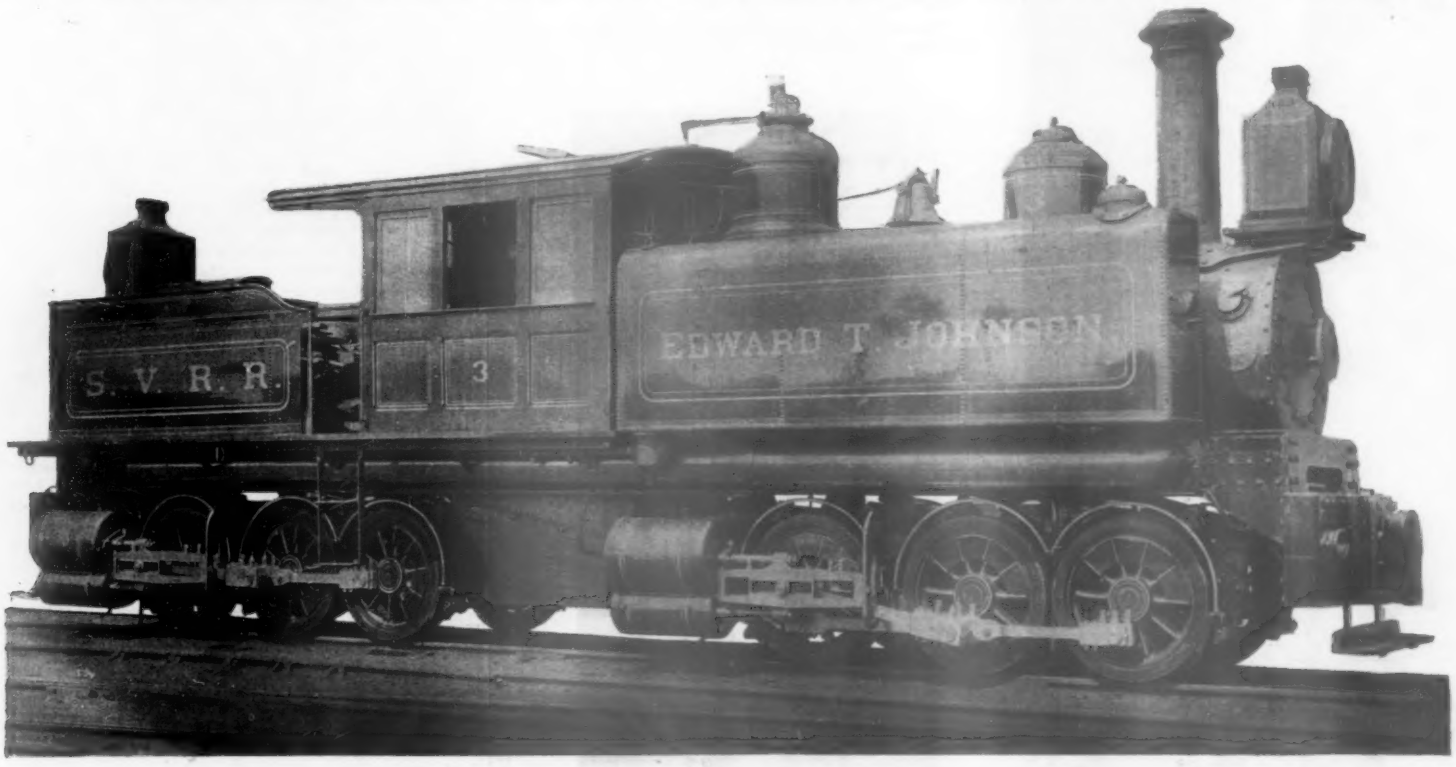
The rules for movement of trains by telegraphic orders are not much modified. Rules 500 *a* and 500 *b* refer to transfers of orders from one dispatcher or operator to another. Rule 503 refers to "a person acting as pilot (should there be one)." This is an instance of the care taken with the language throughout the book. Rule 506 *a* requires an operator to say "*X*" to indicate that his train order signal shows red. This is the same provision as that in rule 524. Rules 511 and 512 are omitted, "19" orders not being used. Rules 515, requiring conductors to send their orders to the superintendent, is also omitted. Rule 524 provides that the signal shall show white when there are no orders. Rules supplementary to this give directions about maintenance of the train order signal and other things. Rule 525 *a* directs freight conductors to register by leaving a ticket, filled out, at every telegraph station where there is not a register book.

In the examples under the forms of train orders the names of the conductors as well as the numbers of the engines are given. Time is given in both words and figures. The train order forms are followed by a speed table. Next come the pictures showing hand and lamp signals, the go-ahead motion being illustrated properly instead of improperly as in the standard code. The book closes with twenty-five pages devoted to the Westinghouse brake, the Baker heater, the "Le Chatelier" water brake and the Sweeney air compressor.

These brake rules, like the other parts of the book have been compiled with care, and, on the whole, are the best that we remember to have seen. The water brake and the auxiliary air compressor are not common east of the Rocky Mountain region, and the chapters on these will therefore be of special interest to Eastern men who see this book. Driving-wheel brakes are to be used daily to test them, but are not to be regularly employed in making stops, "as shocks are caused by their application." If these brakes were always applied simultaneously with all the other brakes on the train this rule would probably be unnecessary. Enginemen are forbidden to use the water brake when running faster than 18 miles an hour.

A Double Bogie Mountain Locomotive.

The 12-wheeled, double locomotive illustrated, was built by the Baldwin Works for logging service on the Sinnemahoning Valley Railroad in Pennsylvania, which has grades of 575 ft. a mile, with curves of 40 degrees. The engine is to be used on stringer track, the cross-ties being placed 20 ft. apart, and the rails laid upon log stringers between the cross-ties. The maximum weight allowable upon each pair of stringers is 35 to 40 tons. A locomotive exceeding that weight must therefore have a wheel base exceeding 20 ft., to avoid overloading the stringers. With so long a wheel base a locomotive of the ordinary type would be too rigid to work upon the sharp curves. The "Edward T. Johnson" has 12 driving-wheels, arranged in two, six-wheeled, swivelling trucks, the firebox being between the trucks. Each truck is driven by Vauclain compound cylinders, the two trucks of course working simultaneously. Live steam is communicated to the cylinders by means of a thoroughly jacketted steam pipe on the engineer's side of the locomotive, and the exhaust steam is conveyed to the stack through a similarly jacketted exhaust pipe on the fireman's side of the locomotive. The steam connections from the fixed steam pipes to the swivelling truck, are made by means of Moran patent flexible joints. The principal dimensions are as follows:

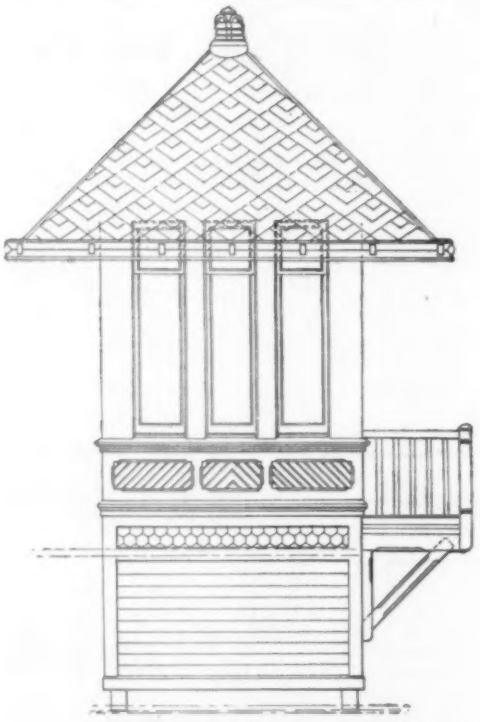


A DOUBLE-BOGIE MOUNTAIN LOCOMOTIVE.

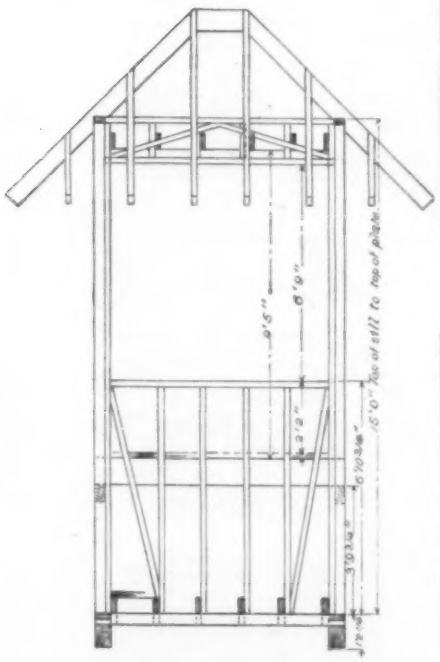
Built by the BALDWIN LOCOMOTIVE WORKS *for the* SINNEMAHONING VALLEY RAILROAD.

Gauge, 4 ft. 8½ in.
Fuel, soft coal.
Cylinders, H. P., 9½ × 18; L. P., 16 × 18 in.
Driving wheels, 40 in. diameter on the tread.
Wheel base of each truck, 7 ft. 6 in; total wheel base, 27 ft. 6 in.
Boiler, 50 in. diameter, wagon top form, of ⅛ in. and ⅞ in. steel, with butt joints and double welt strips.
Firebox 66 in. long, 47⅝ in. wide, 59½ in. deep at front, 40 in. deep at back.
Crown sheet supported by radial staybolts 1⅛ in. diameter.
The water is carried in a rear tank, similar to an ordinary tender tank; capacity, 900 gallons; and in two side tanks holding 1,600 gallons; aggregate, 2,500 gallons.
Coal capacity, 4 tons.
Weight in working order about 150,000 lbs., equally divided between two trucks.
Steam and exhaust pipes covered with magnesia sectional lagging and jacketted.
Piston rods and valve stems fitted with U. S. metallic packing.
Steam brake on all wheels; Le Chatelier pressure brake to act upon both sets of cylinders.
Water supplied by two No. 8 Monitor injectors.

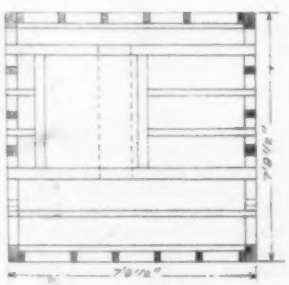
The locomotive is said to be doing satisfactory work upon the Sinnemahoning Valley Railroad, but no special tests of its capacity have been made up to this time.



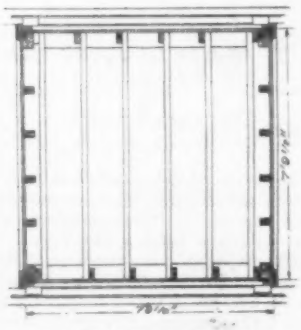
Side Elevation.



Side Elevation—Frame.



Second Floor—Frame.



First Floor—Frame.

Signal Tower to be Erected on the Bridge.

National Convention of Railroad Commissioners.

The proceedings of the first day of this Convention, which was held in Washington last month, were reported in the *Railroad Gazette* of April 15 and April 22. The second day's proceedings have just been issued.

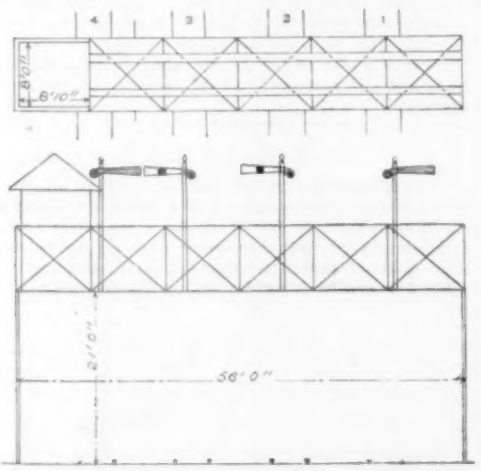
The report of the Committee on Uniformity of Accounts was discussed at considerable length, but no definite conclusion was reached, and the report was finally recommitted to a committee of seven.

The report of the Committee on Safety Appliances was also discussed, but nothing new was shown except that the Commissioners had found great difficulty in getting the members of the Congressional committees to agree upon any proposed bill. The committee was finally reorganized and directed to urge Congress to pass a law to hasten the adoption of freight car couplers and train brakes. The new committee consists of Messrs. Spencer Smith, of Iowa; J. C. Hill, of Virginia; G. M. Adams, of Kentucky; W. J. Dale, Jr., of Massachusetts, and T. J. Hennessey, of Missouri. Mr. Moseley is Secretary of this committee. It will be remembered that the former committee on this subject failed to agree on a law to be presented to Congress, but Mr. Smith of Iowa, stated in the discussion that the bill drafted by him had been agreed to by a majority of the committee and, therefore ought to be regarded as the committee's bill.

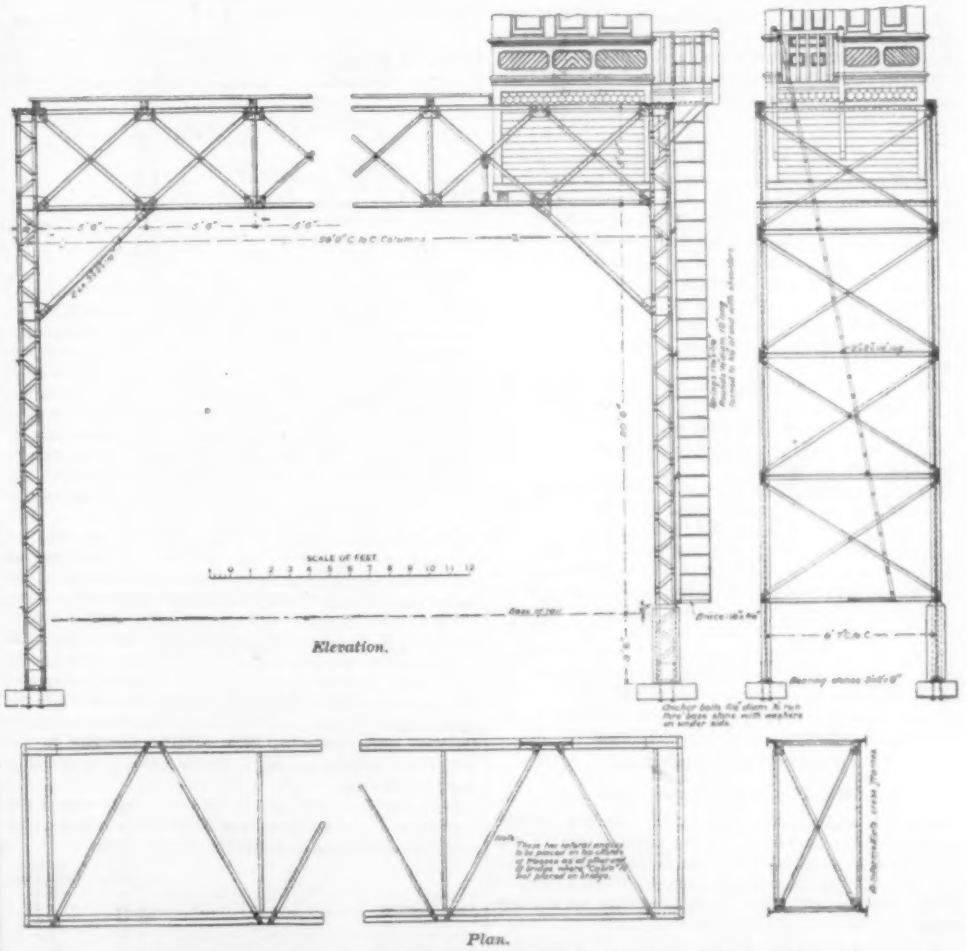
Tower to Stand on the Ground.

Signal Bridges and Towers on the New York Central.

The drawings shown herewith illustrate the principal features of the structures to be erected at the signal stations on the four-track divisions of the New York Central & Hudson River road, in accordance with the plans for equipping the whole road with block signals, as reported in the *Railroad Gazette* of April 1 and other dates. The drawings are self-explanatory. The figure showing the signals on the bridge (which shows them as they will appear to an engineman running east) will strike the ordinary observer as rather odd, but this is to be explained by the fact that on the northernmost pair of tracks the trains (freight) run "left-handed," while on the south pair the trains (passenger) run "right-handed." Thus the two inner tracks are used by westbound trains and the two outer tracks by eastbound trains. Each signal post is directly over the track it governs. The towers built on the ground are of four different sizes, varying according to the number of interlocking levers which it is intended to put into them in the future. Where there is no signal bridge the rule is to locate the home signals 150 ft. beyond the tower. It will be observed that the bridge is nearly 9 ft. wide and so braced as to have ample stiffness.



Cabin and Signals on Bridge.

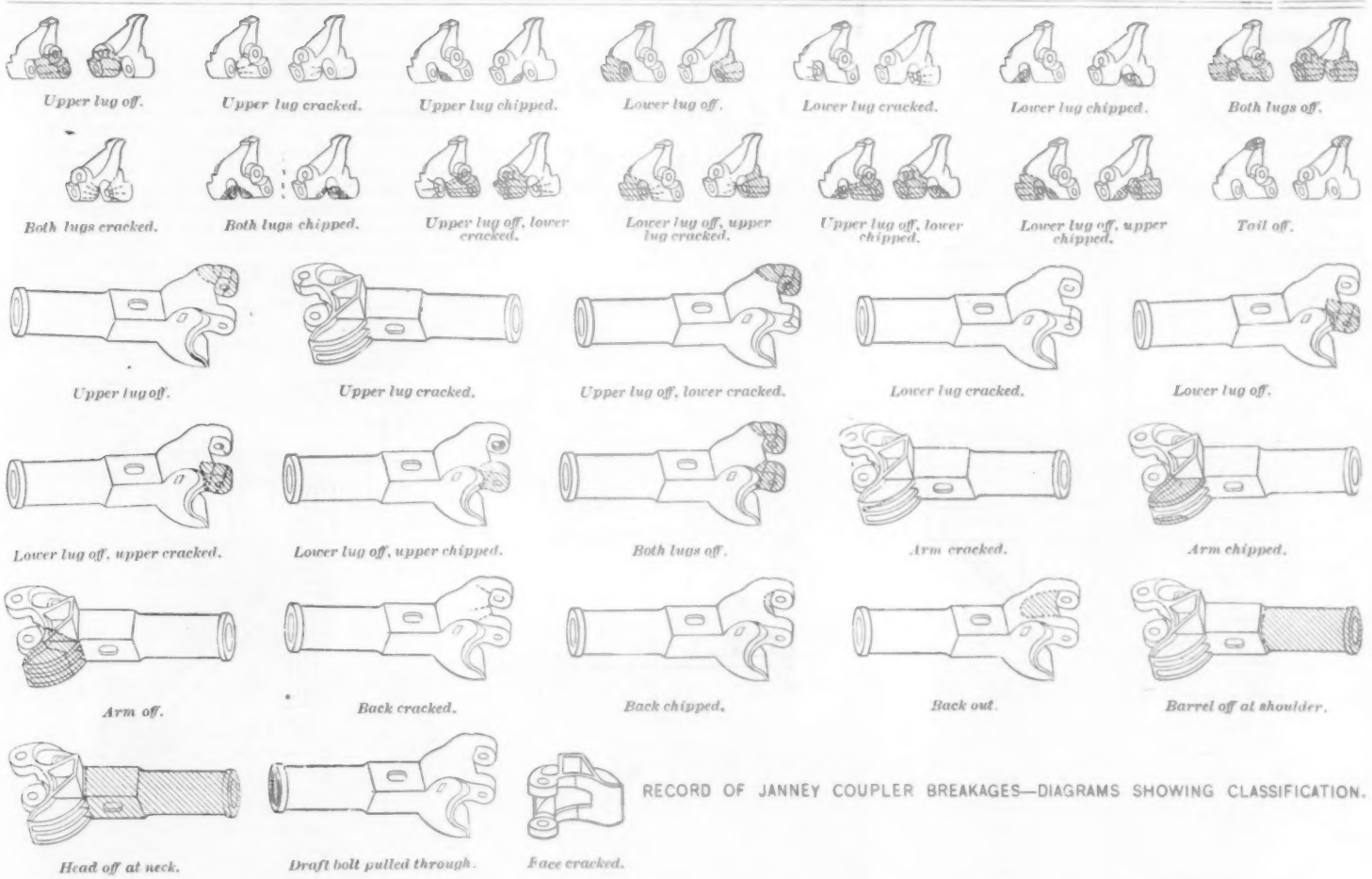


Elevation.

Plan.

56-FT. SIGNAL BRIDGE—NEW YORK CENTRAL & HUDSON RIVER RAILROAD.

WALTER KATTÉ, *Chief Engineer.*



RECORD OF JANNEY COUPLER BREAKAGES—DIAGRAMS SHOWING CLASSIFICATION.

Mr. Smith's bill, which is printed in the report, is similar to Mr. Crocker's, which has been printed in the *Railroad Gazette*, the principal difference being that on failure of 60 per cent. of the railroads to agree on a type of coupler it is provided that the Master Car Builders' contour lines, as described in the reports and circulars of the M. C. B. Association, shall be the legal standard.

The Committee on Railroad Legislation reported that practically nothing had been done since the report of May, 1890. It was believed that the best line of action would be to promote the appointment of Commissions in the several states to take up the general subject of uniformity of laws. Such Commissions have already done good work in New York, Pennsylvania, Massachusetts, Michigan, New Jersey and Delaware.

Hon. W. D. Dabney, who is connected with the Interstate Commerce Commission, read a paper on this subject. It was an intelligent and careful exposition of the evils resulting from the existence of state laws which are in conflict with those made by Congress, and from the unknown possibilities due to the constitutional powers of the states and the general government. A compilation and digest of all state laws was urged.

The Committee on Territorial Assignment of Statistics of operations made a report, which was accepted and adopted. This report indorses the plan of grouping adopted in the third annual report of the Statistician of the Interstate Commerce Commission, but suggests the possible desirability of changes in the future, in districts 8, 9 and 10.

On motion of Mr. Becker, of Minnesota, resolutions were adopted expressing belief in the principle of uniform freight classification, and recommending the Interstate Commerce Commission to persistently continue its efforts to bring it about.

The report of the Committee on Reasonable Rates was discussed at considerable length, but with no profit. That report argued that the state should actively regulate railroad rates, and advocated adoption of the plan pursued by England in the establishment of the Commission of 1888. This includes a law making the findings of fact by the Commission conclusive evidence in the courts. The resolutions proposed in the report, which consisted of recommendations to Congress to pass a law giving the Interstate Commerce Commission the powers of a master in chancery, were approved by the Convention by a vote of 27 to 3, the members of the Interstate Commerce Commission not voting.

Where Janney Couplers Fail.

The tables which we publish to-day showing the distribution of casualties among the various parts of the Janney coupler are from figures furnished by the McConway & Torley Company. They are from a total of 237,434 couplers, which had been in service an average period of 19.12 months, on 27 different roads.

The number of coupler failures is not given, therefore these tables give us no measure of the cost of using the M. C. B. coupler. But the number of couplers from which the records are drawn is so great, the period is so long, and the distribution of the couplers is so wide, that the facts which the tables do show are peculiarly valuable. Nothing approaching these statistics in extent has ever been published before. The first fact to notice is that of all the injuries to the knuckles, 66.53 per cent. were to the upper lug. Nov. 7, 1890, we published similar data from the records of 124,441 couplers, which had been in service 12.27 months on an average, on over 20 roads. We reproduce below from the table published to-day, the percentages showing the distribution of knuckle failures among the 237,434 couplers, and, for comparison, we put alongside the percentages drawn from the 124,441 couplers.

	237,434 couplers.	124,441 couplers.
Upper lug off	27.59	32.0
" cracked	19.08	9.5
" chipped	19.86	19.8
Lower lug off	5.79	6.7
" cracked	2.90	2.0
" chipped	2. 3	2.3
Both lugs off	8.04	8.3
" cracked	0.31	0.6
" chipped	3.52	6.8
Upper lug off lower cracked	0.95	0.9
Lower lug off upper "	0.32	0.4
Upper lug off lower chipped	2.19	3.6
Lower lug off upper "	2.31	3.8
Tail off	0.77	1 4
Worn out	3.80	0.9
No defects	0.57	0.2
Miscellaneous	0.57	0.4

The injuries to the upper lug were 61.3 per cent. of all knuckle injuries by the earlier record, against 66.53 per cent. now. It will be seen that the relative weakness of this part of the knuckle has not been diminished, but has apparently increased. In fact the gradual strengthening of the upper lug described by us June 6, 1890, was made early enough to effect the former record materially, and we know of no further steps in this direction since. It will be seen also that so far as the knuckle is concerned the best place to apply one's energies to increase the life of the coupler is to the upper lug. How much might be done by improving material or design, or both, we will not attempt to discuss now; but we look for no great improvement in the relative frequency of breakages of the upper lug, so long as the link-and-pin coupler is alive, for the link-and-pin necessitates the slot and pin hole in the M. C. B. knuckle. The upper lug is then injured, as we have often pointed out, by short or bent pins, and by the blows to which it is especially exposed, because of the sagging of the front end of the couplers. Thus the upper lug is brought into position to receive more blows than the lower lug gets. The injuries peculiar to the lower lug are 10.32 per cent. In the earlier record they were 11 per cent.

We repeat from the tables the more important of the breakages of the drawhead, or body of the coupler, and give for comparison those of the former record:

	237,434 couplers.	124,441 couplers.
Arm off	51.28	38.1
Arm cracked	1.23	1.2
Arm chipped	11.57	3.5
Face cracked	5.41	2.8
Back cracked	5.13	12.5
Upper lug off	4.09	3.2
Lower lug off	3.39	7.0
Barrel off at shoulder	6.25	13.0
Draft bolt pulled through	3.08	3.0

The injuries to the arm not only remain the most serious part of the injuries to the coupler (apart from the knuckle), but the ratio has increased greatly. The arm casualties are now 64 per cent.; before they were 42.8 per cent. We hope to have data before long to show why this increase has taken place. Meanwhile any attempt at explanation must be conjectural. We are tempted to suggest, however, that the arm breakages have increased, because the number of M. C. B. couplers meeting each other in use has increased, and that the trouble is a radical one to be bettered partly by modifications in design and partly by changes in material.

One is tempted also to excursions into regions of speculation by the difference in the results reported by different railroads; but really such speculations can only be of any value when one is in possession of a good many facts affecting each case.

The record published in 1890 gave the number of coupler and knuckle failures out of a given number in use and for a given time. From that record one could get at a pretty close estimate of the cost of maintenance per car per year. No material for such an estimate is given in the tables now published, but the makers have made summaries from their books which show that the cost to a railroad company is 37.13 cents per year for heads and 23.3 cents for knuckles or a total of 60.43 cents per yea per car. This is on the basis of an exchange by the McConway & Torley Co., of one new knuckle for an old one and one dollar, and one new head for an old one and four dollars.

The Empire Car Coupler.

The illustrations with this show a new type of automatic, vertical plane coupler with a device for opening the knuckle from the side of the car and a safety chain attachment to prevent the coupler from falling on the track in case it should be pulled out of its fastenings.

Fig. 1 shows the side elevation of the coupler under

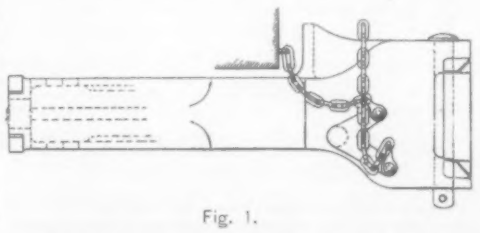


Fig. 1.

the end sill of a car with the two chains attached to the locking shaft. One of these chains is fastened to the car and serves to unlock the coupler when it is pulled out beyond its normal range of movement and also holds the coupler from falling on the track. The other chain is attached to an arm on the unlocking shaft across the car as shown by figs. 2 and 3. From the top of the car a vertical rod connects with the arm on the unlocking shaft and thus the coupler can be unlocked from the top or either side of the car.

RELATIVE FREQUENCY OF BREAKAGES IN DIFFERENT PARTS OF JANNEY FREIGHT COUPLER BODIES.
AS DETERMINED BY COMPUTATION FROM THE TOTAL NUMBER OF BREAKAGES REPORTED BY EACH RAILROAD FROM JAN. 1, 1886, TO MARCH 31, 1892.

	(General Average	Ally. Valley.	Balt. & Ohio.	Chicago Burl. & Q.	C., C., C. & St. L.	Canada Cattle Car Co.	Chicago Milw. & St. P.	Chic'go, R. I. & Pac.	Ches. & Ohio.	Grand Rap. & Ind.	Lake Shore & M. S.	Lehigh Valley.	Mich. Central.	North'n Central.	N. Y. C. & H. R.	N. Y., Chic. & St. L.	N. Y., L. E. & W.	North-ern Pacific.	Penn. R. R.	Pa. Co. N. W.	Pa. Co. S. W.	Phil. Wilm. & Balto.	Rich. & Dan.	Rome, Wat. & Ogd'g.	Union Pacific.	West Shore.	West. N. Y. & Penn.	Wis. Cent.	Misc.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Arm off	51.28	23.45	44.03	59.40	50.09	42.43	61.42	56.89	52.00	42.86	43.29	43.91	42.86	60.01	28.94	16.67	25.76	67.41	62.82	69.54	51.10	68.12	33.89		51.02	17.17	13.92	47.06	49.89
Arm cracked	1.23	1.23	1.33	1.03	1.69	21.21	0.51	0.89	1.60		3.00	4.04	4.15	0.94	3.57	4.55	0.76	0.37	0.47	1.70	0.31		0.73			4.04	19.34	3.52	2.08
Arm chipped	11.57	43.21	30.67	6.61	16.22	18.18	21.13	18.31	16.00	7.11	24.16	19.19	32.61	9.39	22.31	27.27	7.32	12.22	6.07	10.31	8.95	1.81	8.69			15.15	26.53	5.88	12.24
Back cracked	5.14	7.41		3.20	8.20		5.13	4.22	7.20	14.29	10.90	11.11	9.84	2.82	9.79	13.64	4.98	0.74	2.57	9.80	2.47	1.81	3.47		4.08	11.11	9.84	3.92	9.12
Back chipped	5.13	1.48	4.00	1.86	3.92	3.03	1.26	0.22	1.06		3.00	7.07	7.07	1.41	7.07	15.91	21.13	1.48	3.11	2.84	3.46						8.59		3.65
Back out	0.72	0.37	4.00	0.21	1.42	3.03	0.18	0.53	1.60		0.79	0.51	0.4		3.96	6.06	0.88	0.37	0.23	0.32	0.63	0.18	0.18		4.08		4.04	2.59	0.26	0.32
Upper lug off	0.51		1.33	0.52	0.36		0.18	0.35			0.17				0.87		1.11			0.24	1.10	1.81	0.94		4.08	1.01	0.52		8.86	0.32
Upper lug cracked	4.09	2.47	4.00	4.13	2.32	3.03	1.17	3.78	2.12	21.43	1.89	2.02		4.22	1.42		3.89	3.71	5.00	6.21	5.82	6.83	4.46				1.01	7.85		0.26
Lower lug off	0.16											0.51			0.11		0.17		0.19	0.65	0.16								5.99
Lower lug cracked	3.26	4.94	4.00	3.72	3.03	3.03	2.94	3.78	4.06		2.37	1.01		6.53	1.96	1.51	7.55	3.34	0.39	1.05	3.33	2.54	2.35		8.17	5.05	2.59			
Lower lug off, lower cracked	0.01			0.21	0.39												0.12		0.02				0.47			1.01			
Lower lug off, lower chipped	0.01																												
Lower lug off, upper cracked	0.06	1.51	1.33	2.58	2.32		0.90	1.78	2.47		1.42	2.52		1.88	1.96	1.51	4.45	2.96	2.36	0.89	3.14	3.62	3.52		2.04	1.01	1.04	1.96	2.08	
Lower lug off, upper chipped	0.06																0.06												
Head off at neck	0.06																0.06												
Barrel off at shoulder	2.57	2.47	1.33	3.61	1.06		1.35	12.45	1.76								0.06												
Draft bolt pulled through	6.25	2.41	2.67	10.85	6.24	6.06	3.60	4.09	2.40		0.79	1.01	1.16	1.41	1.09	0.76	2.69	2.06	3.02	2.03	5.94	4.71	19.25		20.40		2.62	1.55	5.88	9.08
Burnt	3.08		1.33	0.62	1.07			0.22	1.60	7.14	4.74	3.03	2.32	3.75	8.27	3.03	2.69	4.51	2.96	6.31	1.73	0.65	4.40	6.16	2.04	5.05	9.09	8.81	13.72	7.03
Worn out	0.05									7.14	0.95	0.51		2.35	2.29	2.27	13.06			0.08		0.16	2.11				4.66		1.06	2.60
No defects observed	0.07																			0.08		0.16								
Miscellaneous	0.58			0.41													0.41			1.63		0.31							
	1.47	2.47	1.33	0.83	0.89		0.63	2.44	1.06		2.37	2.52		1.41	2.72	3.79	1.23	0.47	1.48	1.23	0.94	0.36	0.39		2.04	1.32	0.12	7.85	2.34	
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00	100.00	100.00	100.00

RELATIVE FREQUENCY OF BREAKAGES IN DIFFERENT PARTS OF WROUGHT HEAD FREIGHT COUPLER KNUCKLES.
AS DETERMINED BY COMPUTATION FROM THE TOTAL NUMBER OF BREAKAGES, REPORTED BY EACH RAILROAD, FROM JAN. 1, 1886, TO MARCH 31, 1892.

	(General Average	Ally. Valley.	Balt. & Ohio.	Chic'go. Burl. & Q.	C., C., C. & St. L.	Canda Cattle Car Co.	Chic'go. Milw. & St. P.	Chic'go, N. W.	Chic'go, R. I. & Pac.	Ches. & Ohio.	Grand Rapids & Ind.	Lake Shore & M. S.	Lehigh Valley.	Mich. Central.	North'n Central.	N. Y. C. & H. R.	N. Y., Chic. & St. L.	N. Y., L. E. & West'n.	North'n Pacific.	Penn. R. R.	Pa. Co. N. W.	Pa. Co. S. W.	Phila., Wil. & Balt.	Rich. & Danv.	Rome, Wat. & Ogd'g.	Union Pacific.	West Shore.	West. N. Y. & Penn.	Wisc. Cent.	Misc.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Upper lug off	27.59	13.15	16.73	27.85	21.09	14.59	39.78	27.40	19.63	42.65	17.30	24.28	42.86	11.49	11.49	12.31	29.13	33.02	39.25	39.25	39.23	21.48	17.10	38.67	19.18	13.92	37.93	27.28
Upper lug cracked	19.08	17.61	15.70	19.83	20.84	8.23	9.48	8.42	17.58	8.83	33.01	34.15	21.43	33.41	35.08	18.87	23.35	17.89	17.89	10.97	11.23	17.51	11.84	9.34	17.12	19.34	9.58	22.69	
Upper lug chipped	19.86	29.82	31.40	28.76	43.75	16.12	21.69	27.18	13.93	13.23	21.74	18.48	30.68	25.30	23.65	19.36	23.35	15.89	17.01	21.67	31.93	6.67	28.94	6.67	21.65	28.39	8.58	18.85	
Lower lug off	5.79	3.26	5.79	9.75	2.08	13.52	11.18	6.01	2.74	8.83	3.79	5.96	5.79	4.63	2.13	5.75	3.78	4.29	3.83	5.22	3.77	6.7	3.93	1.33	7.83	2.66	9.58	6.51	
Lower lug cracked	2.90	5.34	4.15	1.35	1.04	2.35	2.13	1.70	1.60	2.94	4.76	3.80	2.32	4.86	1.86	3.02	1.54	1.54	2.64	1.87	2.96	3.95	3.95		2.74	2.47	4.21	1.78	
Lower lug chipped	2.13	4.82	3.31	1.51	2.08	2.01	2.77	2.64	1.60	4.41	2.43	1.45	3.47	1.26	2.86	2.71	2.40	2.01	1.87	2.79	13.16	6.85	7.49						
Both lugs off	8.04	6.12		7.62	2.92	5.21	2.77	2.64	5.02	5.88	4.62	5.33	4.63	5.88	3.02	7.82	12.68	8.77	6.60	3.70	6.16	4.68	0.79	15.96	1.06	15.96	7.49	
Both lugs cracked	0.31	0.26		0.27	0.59	1.04	8.92	0.40			0.31	0.19	0.77	2.70	0.26	2.91	0.08	0.16	0.08	0.23			0.40						
Both lugs chipped	3.52	2.60	4.13	1.78	6.32	3.13	3.69	8.74	1.53	4.41	4.45	1.45	2.70	1.26	5.41	1.97	6.01	4.25	2.37	1.10	6.04	0.15	5.40		5.26	2.67	5.17	3.19	2.32
Upper lug off, lower cracked	0.95	0.70	1.65	0.86	0.73		0.74	0.96	0.23		0.58	0.39	0.42	0.80	0.52	0.39	2.12	1.93	1.18	2.37	4.24	0.45	1.88			1.33	0.69	3.19	0.80
Lower lug off, upper cracked	0.32	0.26		0.35	0.31	1.04	0.50	0.21	0.53		0.41	0.39	1.26	0.53	0.39	0.77	0.94	0.47	1.18	2.13	0.69	0.20			1.33	0.69	0.12	1.06	0.53
Upper lug off, lower chipped	2.19	2.08		1.83	1.83	1.04	2.69	3.15	1.11		2.12	1.04		1.06	2.36	3.25	4.01	0.97	2.15	2.01	2.36	2.46	1.32	2.67	0.69	1.52	2.36	
Lower lug off, upper chipped	2.31	1.43	0.83	2.46	2.92	2.08	3.95	5.86	2.28	4.41	1.69	1.57	2.32	2.13	2.59	0.43	1.08	0.97	0.70	0.63	2.70	2.87	1.81	2.33	1.69	2.13	2.59		
Tail off	0.77	0.39	1.65	0.79	0.52	1.04	0.59	1.32	0.46	2.94	0.79	0.57	2.10	3.25	0.76	0.19	1.12	1.44	1.01	1.16	1.58	2.04	1.82		0.69	0.24	5.32	0.76	
Worn out	3.80	0.39	14.88	28.01	0.89	1.04	0.17	1.10	25.80	1.47	0.96	0.72		0.43	1.38	1.18		0.58	1.17	0.34	0.30	0.30	1.32		1.33			0.49	
No defects observed	0.57	2.08		0.38	0.16		0.08	0.37	0.68		0.96	0.77	0.84	0.49	0.23					0.31	0.39	0.68	1.32		1.32		0.12		
Miscellaneous	0.37			0.32	0.16		0.11	0.07	5.48		0.24	0.09	0.42	0.85	0.36														
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00	100.00	100.00	10 00	100.00

NOTE.—Three roads in the above table (viz., Baltimore & Ohio, Chicago, Burlington & Quincy and Chesapeake & Ohio) had an unknown percentage of wrought iron passenger knuckles mixed in with the freight knuckles. As passenger knuckles wear out on the inner face faster than freight knuckles and rarely break, this admixture produces a great difference in the "Worn Out" percentage of these roads. Though several other roads in the table are using Janney passenger couplers none but these three use wrought iron knuckles for passenger service.

Figs. 4 and 5 show sections of the coupler with the lock in position. The lock consists of a horizontal shaft with four arms; one forms the lock, another the point of attachment of the knuckle opening device. The remaining two arms are connected to chains as just described. The opening device consists of a short link connected to an arm on the lock shaft at one end, and to the knuckle on the other, in such a way that when the shaft is revolved the knuckle is pulled open. In fig. 5 is shown the projection on the knuckle which fits into a corresponding projection on the head, and relieves the pull on the pivot pin.

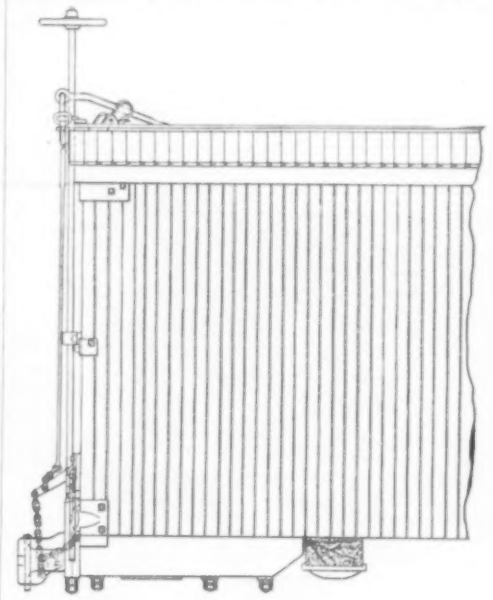


Fig. 2.

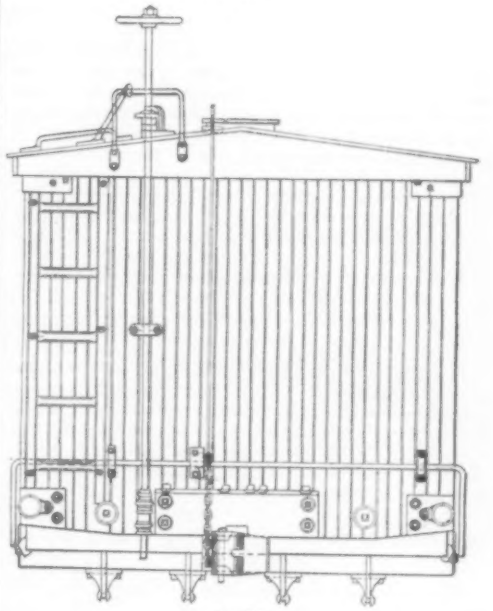


Fig. 3.

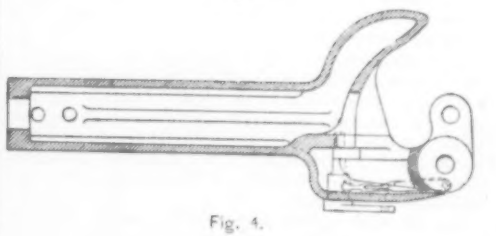


Fig. 4.

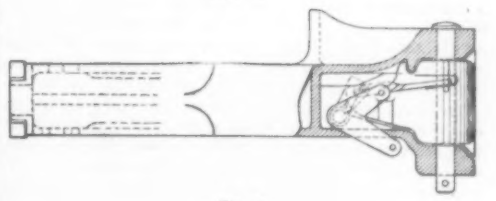


Fig. 5.

It is claimed for this coupler that it is truly automatic in the sense that the one does not have to go between the cars for any purpose connected with its operation; it can be uncoupled when there is a strain upon the knuckle; it will automatically uncouple if the head pulls out, and it can be operated from the top or either side of the car. The head is made of malleable iron and the knuckle of a special steel.

This coupler is sold by The Empire Car Coupler Co., 15 Warren street, New York City.

The Johnston Car Coupler.

A strictly automatic coupler is shown by the accompanying illustrations. The knuckle is thrown open by a spring which is held in a recess at the side of the drawhead shown in fig. 1. There is also a recess in the back of the tail of the knuckle, fig. 2, which serves as a pocket for one end of the spring. The lock is of simple form with a top lift and a beveled face which permits the knuckle to raise the pin as the coupler is closed. The lock is shown in fig. 3. The unlocking gear for the knuckle is indicated in fig. 4; it is of ordinary type with an arm at the side of the car.

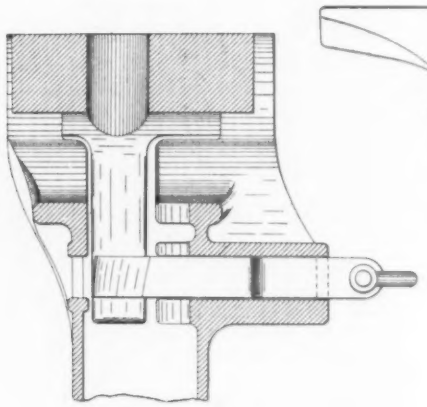


Fig. 3—Section A B.

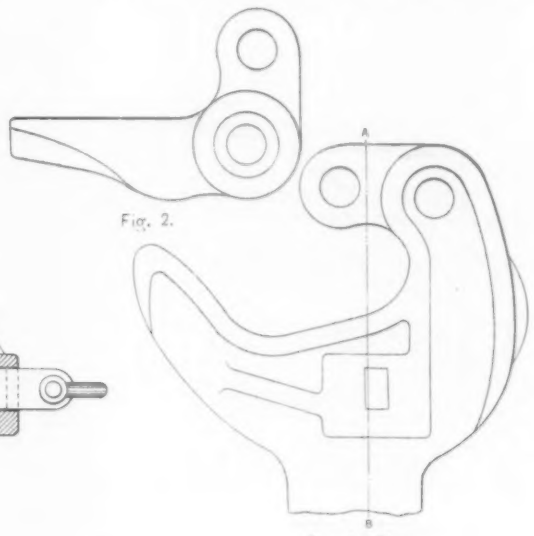


Fig. 2.

Fig. 1—Plan.

E. H. JOHNSTON'S CAR COUPLER.

This coupler is an exceedingly simple one and weighs but 185 pounds with lifting gear, automatic opening spring, and all details. The knuckle weighs 35 pounds. The knuckles are made of a special steel such as is made for the Government, which has an ultimate strength of 60,000 pounds per square inch and 25 per cent. elonga-

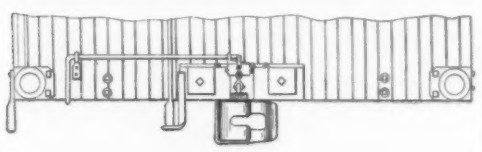


Fig. 4.

tion. The heads are made either of cast steel or malleable iron, as desired. The outline of the coupler is made to conform exactly to the Master Car Builders' lines. The tail of the coupler is made suitable either for a tail bolt or a strap. This coupler is the invention of Mr. E. H. Johnston, and is sold by the Johnston Car Coupling Company, of Philadelphia, Pa.

The Reading Locomotive Coaling Station at Port Richmond.

Within the past few years several improvements supplying locomotives have been introduced with a view to diminishing the cost of handling the supplies. Among the advances in this direction are stand pipes and track troughs for quickly furnishing water, and the improved methods of placing coal upon the tender. The last step in this direction is the economic handling, by continuous machinery, of the coal going to, and the ashes coming from, the engines. These improvements have been lately introduced by some of the large roads, notably the Philadelphia & Reading, the Chicago & West Michigan, the Delaware & Hudson Canal Co., and the National Storage Co.

The illustration represents a coaling station recently erected (and put in operation last month) near the Lehigh avenue round house of the Philadelphia & Reading in Philadelphia for the purpose of coaling and handling the coal and ashes of the locomotives running to and from the immense docks at Port Richmond.

The general plan is that the coal is dumped from the car into a chute opening on to a conveyor which passes beneath and to one side of the tracks and then ascends the incline, discharging into a horizontal conveyor which runs over the storage and loading pockets, from which the coal is discharged into the locomotive tenders.

The station illustrated handles anthracite coal, in sizes from dirt to steamboat, at the rate of 120 tons per hour. The latest improvement which is embodied in this plant is an inclined ash conveyor, which passes below the tracks and adjacent to sunken ash pockets. This is placed above the inclined coal conveyor and takes the ashes coming from the engines out of the sunken pockets up the incline to the large steel pocket shown at the head of the incline.

The station, like all others of its class, was built by the Link Belt Engineering Co. and uses the Dodge Conveyor system, the details of which are illustrated in the smaller engravings in which is employed a wrought iron cable chain, having detachable malleable iron wearing blocks between each link, together with attachment blocks inserted at intervals, to which are attached peculiarly curved flights which scrape the coal along the trough.

At New Buffalo, Mich., a coaling point on the Chicago & West Michigan, there is one of these stations which handles bituminous coal and which is somewhat differently arranged, owing to the use of non-dumping cars in the West. Here, where the conditions are less favorable for economic handling than in the East, Mr. J. J. McVean, Chief Engineer of the road, says: "It has reduced the cost of handling our coal to about six or seven cents per ton; where, before, it cost us 12 to 15 cents per ton. I think, for any point where large quantities of coal are to be placed on locomotives, it is the best arrangement I know of." In the East, with favorable conditions and dumping cars, the cost of handling does not exceed one-half of the above amount.

As these stations are permanent in their character from an economic point of view, they necessarily form a money saving or rather money earning part of a railroad equipment.

The New York Rapid Transit Commission.

At the meeting of the Supreme Court Commission held at 5 P. M., May 4, at No. 22 William street, the Engineers of the Rapid Transit Commission were examined by the counsel for the Commission.

There were present Messrs. O. B. Potter, who stated that he expected to be represented by counsel, but would for the time being cross-examine witnesses himself, but wished the privilege of recalling witnesses for examination if necessary; Mr. William Irwin, for the Mail & Express Co., which objects to the construction of the road under Broadway; Mr. George R. Fearon, who appeared for the Western Union Telegraph Co., and stated that he had only heard of the meeting of the Commission two hours previously and desired time for preparation for the examination of witnesses; and Mr. Lawson N. Fuller, of Washington Heights, who stated that he represented a large amount of property and a large number of property owners in the upper part of New York island, who objected to the road and who would secure the services of counsel to cross-examine witnesses, but that they had not done so yet.

THE WORTHEN PLAN.

The first witness was Mr. William E. Worthen, the former Chief Engineer of the Rapid Transit Commission, who prepared and recommended the plan which was adopted by them.

The greater portion of his direct testimony consisted in answering "Yes" to questions propounded by Mr. Bowers, which were to the effect that he had carefully studied the plans of construction, and thought that a railroad could be constructed under Broadway at a depth of from seven to nine feet below the surface without opening or disturbing the surface of the street in any way except at the proposed stations, which would be about a quarter of a mile apart. At these points the entire surface of the street would be opened and a temporary bridge placed over the gap. The station areas would be first excavated and then used as a storage place during the day time for the material excavated from the headings running each way. This material would be carted away at night. The headings he proposed to open to about one-half of the width of the roadway, and then to lay a track in the tunnel from the Battery, and transport the remainder of the excavated material to the Battery, the cars on their return trip bringing the material needed for construction. The method of construction of the roof of the tunnel proposed by him was to protect the roof of the heading by iron poling boards supported on trestles and pushed forward by hydraulic jacks. After each advance the material at the end of the heading would be removed and the roof put in, consisting of wrought iron plates resting on 15-in. I-beams supported on posts from the centre and on the vault walls at the sides of the streets. This iron roof he thought could be effectively protected from corrosion by injecting some preparation of coal tar in a liquid state to be forced in by pumps from the surface of the street. He estimated that the entire tunnel could be constructed and the roadway and equipment completed for $3,500,000 per mile from the Battery to Fifty-ninth street.

Mr. Worthen was cross-examined by Mr. O. B. Potter, who evidently labored under the impression that the plans suggested by Mr. Worthen had been adopted by the Rapid Transit Commissioners as the method of construction, and considerable time was wasted in discussion by the counsel and the witness as to the exact method of operation under Mr. Worthen's project. The witness expressed the opinion that the coating which he suggested was perfectly feasible, and that it would protect the structure probably 100 years. He had never seen any such work done, or known of any similar work being done. He considered that there was less chance of settlement on the surface of the street in excavating a tunnel in the manner he proposed at a depth of seven to nine feet below the surface than there would be if the tunnel ran deeper below the surface of the street. He would not think it wise at any rate to build any road by opening the surface of the street, and he considered that if the necessity existed for opening the whole street, the construction of a tunnel under Broadway would be entirely impracticable. He thought that it would be perfectly easy to blast out rock below the street surface provided only there was sufficient room above the rock to get in the roof shield. He believed that the tunnel could be perfectly ventilated, and that the construction and operation of the road would not result in any damage to adjacent property.

His idea with reference to the motive power was that there should be an electric motor on each car; cars to be coupled and to be run in trains of any required length. He would have the cars vestibuled so that there should be continuous passage through the train. He thought that trains of seven cars carrying 350 passengers could be run on from one minute to a minute and a quarter headway, and would thus carry a great many more passengers than the elevated roads can.

Mr. John Bogart, former State Engineer, and one of the Consulting Engineers to Rapid Transit Commission, was next examined.

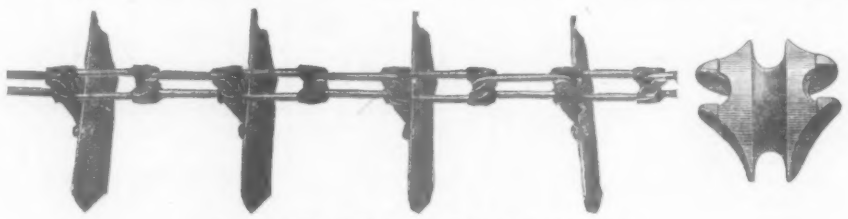
He considered the construction of a tunnel in the fine sand at a depth of seven to nine feet below the surface to be entirely practicable without disturbing the surface of the street. He acknowledged that he knew of no tunnel constructed under similar circumstances without settlement of the ground above.

The Commission having been in session two hours and a half, adjourned until the next day.

On May 5, the Commission met at 5 p. m. Pomeroy P. Dickinson, Chief Engineer, of Poughkeepsie, N. Y., was examined by Mr. Bowers.

THE ARCADE PLAN.

He testified that he had made plans several years ago for the construction of the Arcade Railroad under Broadway, and had been connected with a construction company which had made a contract with the railroad company to build a road from Bowling Green to Fifty-ninth street. Under the contract it was left optional with the contractors to either tunnel or excavate the whole material from the surface of the street provided that travel on the street was not interrupted during the progress of the work. The plan had anticipated the entire excavation of the street between the curbs, keeping the traffic on the street in operation by bridges. He expected to remove the material by carts at night. His estimate of the cost of the construction and the equipment of the Arcade road built as specified in the contract, but not including any expenditures for right of way or damages to property, would be $3,480,000 per mile. He considered it



Details of Dodge Conveyer System for Coal, etc.

Philadelphia & Reading Coaling Station at Port Richmond.

feasible with proper care to tunnel without opening the street.

Mr. Dickinson was cross-examined at considerable length by Mr. Potter. The questions of the examiner were very long and complicated, and the answers of the witness were equally diffuse, and never in any instance gave a positive and intelligent reply to a question, introducing qualifications to every statement which approximated to clearness. The only exception was that he stated that he had never carried a tunnel partly through earth and partly through rock, with the roof from 7 to 9 ft. below the surface of the ground. In reply to a question as to whether he considered it feasible to carry a tunnel a short distance below the surface of Broadway, through wet sand, with leaks in the water pipes overhead, he replied that when he came to a leak he would dig up to it and calk it from below, and that it was a perfectly easy matter to carry a tunnel through that material if proper care was taken in the excavation. The statements of the witness with reference to the practicability of carrying a tunnel without opening the surface of the street, were qualified by the statement that with proper care and attention to details it was possible to do so. He considered that the surface of the street would not be likely to settle or cave in, because the pavement was laid so solidly at present that it would act as an arch.

ELECTRICITY AS MOTIVE POWER.

The next witness called by Mr. Bowers was of an entirely different character—Mr. Frank J. Sprague, who graduated at the Naval Academy at Annapolis in 1878, and was in the naval service for some years, but for the last eight years has been engaged in the development of the application of electricity as a motive power. He was a capital witness.

The counsel, after one or two preliminary questions, did not attempt to lead him in the direction in which he was intended to go, but he talked without interruption in an exceedingly intelligent, fluent and attractive manner.

He stated that the first electric railroad was operated experimentally 13 or 14 years ago by Mr. Edison. In 1883, Vanderpoel and Daft experimented with a motor, and in 1885 some experiments were made by Mr. Sprague with a motor on the Thirty-fourth street branch of the Elevated Railroad in New York. Efforts were made in 1886 and 1887 to utilize storage batteries on cars, but they had been found to be commercially impracticable. In 1888 there were 13 electric railroads in this country. At the present time there are 450 in operation or in course of construction; there are 10,000 motors operating electric railroads and there is $75,000,000 invested in electrical railroad plants. Two-fifths of the car mileage of the country to-day is electrical. There are now in course of construction five electrical locomotives of 40 to 80 tons weight which are being constructed under contracts with railroad companies, guaranteeing their efficiency and capacity for hauling heavy trains at high speed. The advantage of an electrical locomotive over a steam locomotive is that there is no reciprocating motion nor unequal pounding of the rails. They are consequently much less destructive to a railroad track, and there being no escape of steam, or irregular motion, they will be much less noisy.

Mr. Sprague made a proposition to the Rapid Transit Commissioners favoring an underground road using electric motors, and offered to take a contract for the plant and to guarantee the capacity of the locomotives to carry seven-car trains, seating 350 passengers, at 40 miles an hour. He proposed to carry the electrical current through a rigid bar attached to the roof of the tunnel, and to return the current through the rails of the track. The intensity of the current would be about 800 volts.

On May 6 the Commission met at 4.30 p. m., and Mr. John Schuyler, for the Terminal Underground Railroad Company, submitted written objections to the Broadway and Fourth Avenue routes, on the ground that they interfered with the routes laid out by that company in 1886.

MR. SOOYSMITH'S OPINIONS.

Mr. Charles Sooysmith testified that he was a graduate of the Polytechnic institutes of Troy and Dresden, and is now engaged with his father as engineer and contractor for tunnels and foundations. He had examined the plans of the Rapid Transit Commissioners, and thought it entirely feasible to build a tunnel without obstructing the street or the foundations of buildings. He described in a general way tunnel excavation by means of a pilot and a shield, and the process of freezing quicksand by the Poetsch process, which his father controls in this country. He did not think it would be necessary, however, to use that process in any case on Broadway. He said that if the sand should prove to be saturated in any case it could be drained out very readily ahead of the work by pilot pipes, so that when the excavation was reached the sand would be dry. Ordinarily, he thought, the work could be carried on by using poling boards to sustain the roof of the heading in the manner proposed by Mr. Worthen.

The Chairman of the Commission had evidently absorbed a good deal of tunnel information by this time, and asked the witness several questions showing a very intelligent apprehension of the subject.

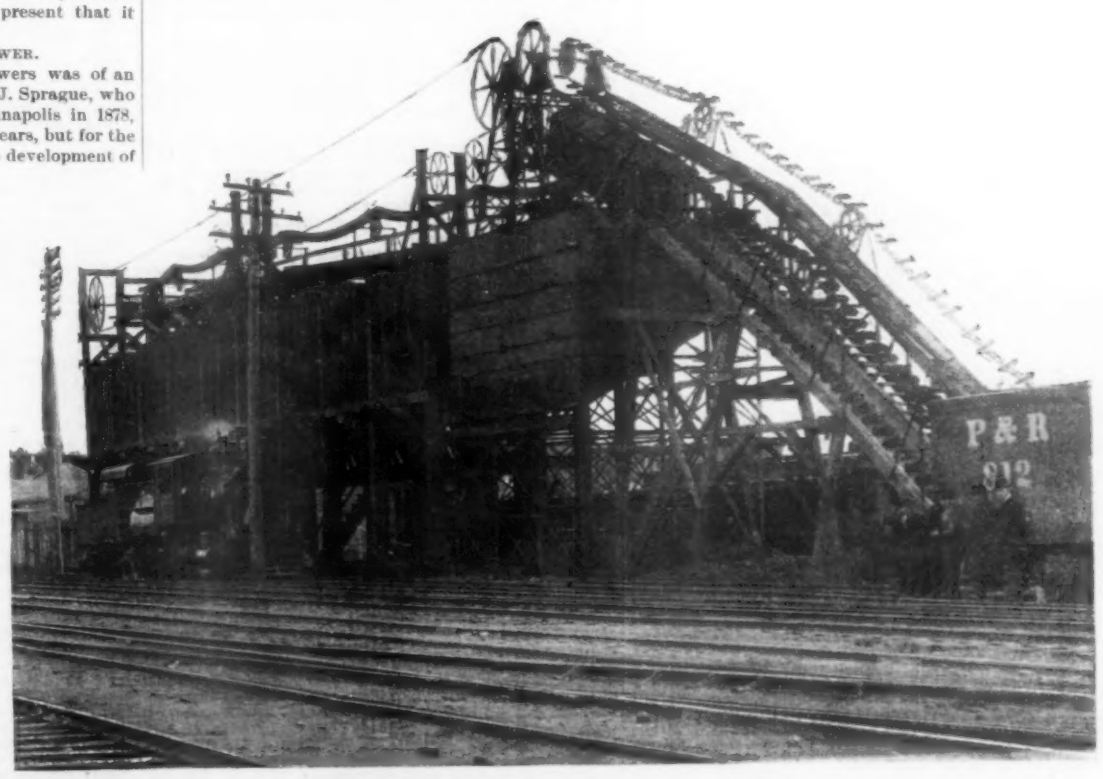
Mr. Sooysmith estimated that the cost of the excavation and equipment of the tunnel from the Battery to Twenty-third street would be from $3,500,000 to $4,000,000 a mile, and from Thirty-third to 121st street, where the excavation could be made in open cut, he thought the excavation could be made for $1,500,000. It would take about two years to build the road complete from the Battery to Yonkers, and his firm were ready to take a contract for the work with a guarantee against all damages to buildings on the route. In Broadway from Thirty-fifth to Fifty-ninth street, he would probably open half the street at a time, leaving the other half for travel, and using bridges at the cross streets. In case of rock occurring near the surface at about the elevation of the top of the tunnel, he would suggest an under tunnel and breaking out the thin rock roof from below by special appliances.

Mr. Sooysmith was not cross-examined by any of the opponents, there being nothing in his testimony indicating any special knowledge of the ground under Broadway.

The remainder of the session was occupied by the testimony of Messrs. G. W. Mansfield and E. O. Blackwell, representing the Thomson-Houston Electric Co., who expressed their entire confidence in the capacity of their company to build an electric locomotive which should be able to handle all the traffic on the proposed railroad, and stated that if occasion should arise they would be glad to submit proposals for equipping the road with guarantees as to the efficiency of the plant. It did not appear from their testimony that any locomotives of the required capacity had ever been constructed as yet.

The Chignecto Ship Railroad.

It is confidently believed by those interested in this project that construction will be resumed within a few months. The stockholders have sent an agent to America to get bids and make contracts, making separate contracts for the different parts of the work, and have voted to assess the stock for the money necessary to carry the work to completion.

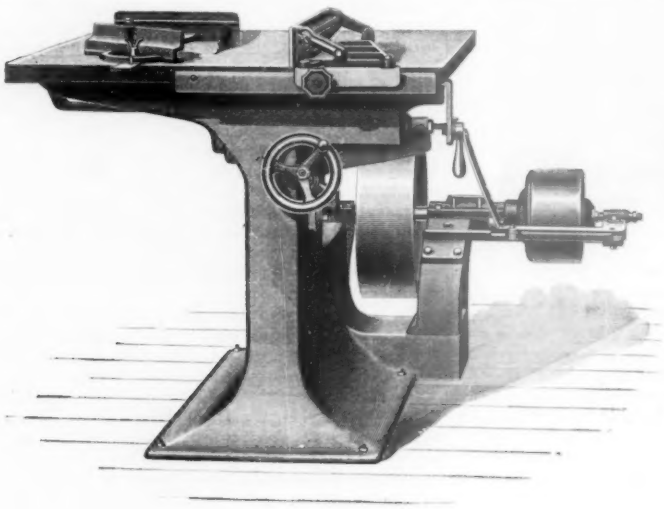


Philadelphia & Reading Coaling Station at Port Richmond.

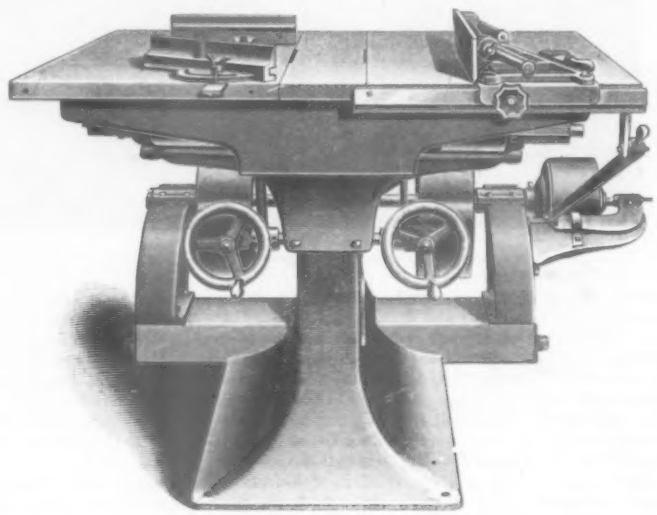
An Improved Saw Bench.

In the saw benches shown by the accompanying illustrations, one single, the other double, the ordinary tight and loose pulleys are replaced by a self-oiling friction clutch pulley operated by a lever extending to the front of the machine in a convenient position for the operator The counter shaft is attached directly to the bed of the machine. The saw arbors are hung on a heavy swing frame pivoted to the bed of the machine, and raised and lowered by the hand wheels shown. There is a removable centre strip next to the saw which can be quickly taken out, to allow the insertion of a grooving head. With each machine is supplied a White's patent bevel splitting rest and one square and one mitre rest.

The double saw bench is made with a 48 in. × 42 in. iron table, and weighs 1,550 lbs. The single bench, with wood or iron table, 42 in. × 37 in., weighs 800 to 1,000 lbs. These tools are made by The John A. White Co., Concord, N. H.



Single Saw Bench.



Double Saw Bench.

Rules of Interchange.

At the April meeting of the Western Railway Club the President announced that the topic of discussion would be the Rules of Interchange.

The report of the committee, of which Mr. Barr was chairman, had been received at the March meeting, and some of its recommendations adopted; the remainder of the report was taken up, the first point to be discussed being that of hours of labor charged for certain car repairs.

Mr. BARR: I have had the prices for doing work on the various items mentioned on page 142 (club proceedings) carefully revised since our last meeting, and we believe now the figures should be as given in column No. 2, in table below, column No. 1 being the figures given last month.

Labor charges for replacing

	Col. No. 1.	Col. No. 2
1 Draft sill	36	36
2 Draft sills	42	45
2 Intermediate sills	35	40
1 Intermediate and 1 draft sill	41	42
2 Intermediate and 2 draft sills	47	52
1 Intermediate sill	20	23
1 Side or intermediate sill spliced	18	13
1 End sill	..	23
1 Draft tumbler	10	6
2 Draft tumblers (on same end)	14	10
1 Cross tie timber	8	8
1 End post	10	6
2 End posts (on same end)	15	9
1 Corner or side post	7	8
1 Swing bolster	8	6
1 Swing plank	5	5
1 End plate	10	18
1 Draw bar	2	2
1 Door stop side	2	2

Two cents per square foot for all sheeting, lining and roofing. One cent per square foot for flooring. Three-fourths cent per square foot for paint and nails.

Mr. R. D. SMITH: I don't just see where the difference in labor comes in between 23 hours for an intermediate sill and 36 hours for one draft sill. It would seem to me there is not that much difference in the labor necessary. And the same would apply to the two intermediate sills and the two draft sills.

Mr. BARR: The replacement of intermediate sills don't involve any manipulation of the draft rigging or anything of that kind.

Mr. SMITH: There is only five hours' difference between tw intermediate and two draft sills, or 2½ hours to each sill, while in your figures for one intermediate and one draft sill you have a difference of 13 hours.

A MEMBER: I think Mr. Barr's figures are about right. You will find similar differences in the prices of contract work as now taken in some of our shops. I think we have a representative here from the Pennsylvania system; perhaps he can enlighten us us from actual experience. As an illustration, I would cite their contract prices for draft sills, namely, $6.50 for labor of replacing one sill and $1 for each additional sill.

Mr. BARR: I do not think that that applies to repairs of cars in interchange, but to repairs of their standard cars. There they have standard sills, and the labor on them is light. There is no laying out of the work and no fitting of any kind. Under such conditions I don't know but what their figures are about right. But with freight cars we have to take the old sill down, cut another one like it, and then get the two sills together and lay out mortises, etc., so that there is a material difference in the work involved in the two cases. I do not believe the Pennsylvania road would be willing to let those figures apply to repairs of foreign cars.

On motion, it was decided that the Club recommend this section of the committee's report, as modified by Mr. Barr.

President PECK: There is one important subject mentioned by the committee on which no action has been taken—the carding of old defects. Mr. Barr is strongly in favor of having old defects carded by the owners of the car only.

Mr. SCHROYER: I would favor that to a certain extent. The difficulty in that direction has been this: Cars have been off the owning road for a year or more, during which time they have received slight defects on some foreign road; but the cars are kept away from the owning road so long that these defects are classed as old ones when returned to it. In a case of that kind you would say that the owner should be responsible for it. I hardly think so. As an offset to this, the claim was made at the last meeting of the association that we were receiving so much per day or so much per mile for the use of our cars. I think that that claim is about on a parallel with our charging for the replacement of brasses and brake shoes; it costs more than it comes to. But I must say emphatically that there are defects which never should be carded. We are getting to such a state of affairs in our interchange that if a nut doesn't stand square you have got to card for it. I think that there is altogether too much carding.

Mr. RHODES: I do not believe that it would be a good plan to abolish the carding of old defects. I fear it would be found to have the same effect as Rule 8 has had. In place of the equipment being kept in better it is in worse repair; and if we allow old defects to pass without anybody taking exception to them, the result will be that our equipment will get into very poor condition.

Mr. BARBER: I would be ready to do almost anything to simplify or lessen the carding of cars. I would be willing to vote for this suggestion as it stands—not to card the old defects—or it might be modified so as to refer to the larger timbers of the cars, or something of that kind.

Mr. SCHROYER: That is where I think the great difficulty would be encountered. Mr. Barber says it might be modified to refer to certain parts. Those are the very parts I want excluded. The car might come to an interchange with a crack in the sill, of such a nature that the latter is materially weakened and may, while in your service, be the cause of wrecking the car. I think, whether the defect is old or new, it should be carded for if it materially weakens the car.

Mr. SMITH: I am heartily in favor of anything that will reduce this tremendous amount of carding which we are doing. I think the suggestion of the committee is in the direction of a very fair arrangement that will affect all roads equitably.

Mr. TOWNSEND: I am in favor of discontinuing carding these old defects, but as Mr. Schroyer says, if a car has got a cracked sill, it is all right that it should be carded for. Now, I believe that nine-tenths of all the trouble about the delay of cars comes from carding for old defects.

The recommendation that a rule be inserted requiring that old defects shall not be carded for except by the owners of the car was carried by a small majority.

President PECK: The next question is that of doing partial repairs on bad order card.

Mr. SCHROYER: I would suggest that the Club recommend that partial repairs on a card be made when necessary, and that the parties making the repairs be given authority to remove the original card, and bill against the parties who placed the card on the car for the repairs actually made, and place a card back on the car covering the defects remaining and which were mentioned on the first named card, making the original carders of the car responsible for those defects; and that in rendering bills on the cards removed on partial repairs it must be so stated on the bill.

Mr. RHODES: The railroad company undertaking to make the repairs is the judge of what it ought to do. If it is not to the railroad company's interest to make the full repairs that the card calls for, let it do what is to its interest to do. For instance, if it believes it best to make partial repairs, it should have them made, and let the car go on without removing the card. It might be well to cross off from the card the defects repaired. I do not believe that we are going to improve the equipment by making certain repairs that are easy to make and letting others pass that are not easy to make.

Mr. SCHROYER: It is sometimes the case that a car carded for certain defects is further damaged on our road, and in making the repairs we are required to repair some parts covered by this defect card. Now, inasmuch as those parts are defective when we receive them, we certainly should have some means of collecting from the parties who did the damage. Our practice always has been that where we are required to make any repairs, covered by a defect card, we will make all of them and bill against the parties carding for same. I move that it is the sense of this club that where repairs must be made the original card be removed and all parts not repaired crossed off and bill rendered on same; the company doing the work to place a card on the car against the original parties for repairs on same, and notify them of the same.

Mr. RILEY: We are frequently obliged to repair cars that are covered by card, and we make partial repairs and let it go at that. I have a case in mind which seems to illustrate pretty well the difficulties we meet in that respect. It was a car delivered to us at Chicago under a card for a common cast drawbar in place of a vertical coupler, and a broken vertical coupler (slightly damaged) at the other end. On delivering the car to the New York Central we were obliged to replace the broken vertical coupler, and had the privilege of removing the card, in which case, of course, we would have to apply our card for the common cast drawbar. We meet with such things frequently. Perhaps the draft rigging and the sill are on the same card. We repair the draft rigging but we cannot remove the card unless we repair the sill.

The motion of Mr. Schroyer was lost.

Mr. RHODES: I would like to see an addition made to Rule 3. There is a great deal of attention now given to brakes, and very few companies are without the air-brake on their new cars. The other day I saw some new 50,000-lbs. cars without air-brakes, and the hand brakes on one truck only. It appears to me that cars of 40,000 lbs. capacity and over, which don't have brakes on both trucks, should be liable to rejection. I would not approve of such a rule applied to cars of less than 40,000 lbs. capacity, because there are a great many of the lighter cars running with hand brakes on one truck only; but it would seem that all cars of 40,000 and over ought to have hand brakes on both trucks, and if the Association puts a clause of that kind in the rules it will attract attention to it. As it is now, attention is not directed to it, and some railroads are building cars and putting the brakes on only one truck. I move that it be recommended to the Association that the following clause be added to Rule 3, among defects for which cars may be refused: "Cars of 40,000 lbs. capacity and over which do not have brakes on both trucks." (Carried.)

Mr. FORSYTH: I am not much in favor of increasing these rules, but I want to call attention to a defect which has not been considered one to be carded for, yet which is really a part of our cars, and I would favor the introduction of a clause under Rule 3, Section u. The section as now recommended by this club, reads simply, "drawbars and attachments in bad order." Paragraph 3 of the Rules, as they stood for the past year, provides that "drawbar stem, rod and bolt must be sound and secured back of drawbar follower plate by a nut or flat key; this is to be secured by either a ring or spring cotter." This clause is evidently intended to secure strength of the drawbar attachment, and yet there is nothing said about the size of the section of the bar. Now, we have recently taken out of foreign cars some tail bolts which were 1⅝ or 1¾ in. in diameter, secured by a key, and pulled them in our testing machine. We have broken such keys at as low as 40,000 lbs., and broken the bolt at 50,000 or 60,000 lbs. A 1¾ in. bolt with a key will not stand much over 70,000, and you would be surprised to see how small a section of iron there is in a tail bolt which has a key. The area is not as large as that of a common link, and I think it is essential, with our large engines and heavy capacity cars, that the strength of the whole train should not be impaired by the introduction of the old cars having small tail bolts. In view of these results, I think it is important that in this section of Rule 3, there should be added, "tail bolts for cars of 40,000 capacity and under, not less than 1¾ diameter; tail bolts for cars of 50,000 lbs. and over not less than 2 in. diameter." I move that the clause be inserted in that part.

Mr. SCHROYER: I do not see why we should have two sizes, for our 40,000-lb. cars must stand as great a pull as the larger cars.

Mr. FORSYTH: It is not advisable to work a hardship to a large number of car owners who have 40,000-lb. cars with draft gears, in which tail bolts are employed; they should have an opportunity of replacing them, and cars which have a tail bolt of reasonable size may not be condemned under this clause.

Mr. SCHROYER: Mr. President, I would like to amend that by adding the words "cars with automatic drawbars," instead of 50,000 lbs. and over. We do not want to have cars with automatic couplers and 1½ in. tail bolts, and thereby wreck our trains.

Mr. TOWNSEND: I had a case where the tail bolt head pulled out through the drawbar and wrecked six cars.

Mr. RHODES: Mr. Forsyth's idea is, I think, more to draw attention to this matter than anything else. It is not exactly what I would recommend, or what any of us would recommend to be used on our equipment, but the point is this: We have small tail boats on our equipment, largely on 30,000 and 40,000-lb. cars, but in some cases on 50,000 and 60,000-lb. cars. This is true of a great many railroads in this country, and in connection with the M. C. B. couplers as well as the plain bars. Our road recently fitted a number of 60,000-lb. cars with 2-in. tail bolts. These cars were in service but a short time before the heads of the bolts began to pull off. We recently made a test of a bar from another road in our laboratory; it was fitted with a tail bolt, and the latter broke at 90,000 lbs. That was a tail bolt coming out of

a railroad company's shop, with no reason for its being poorly made at all.

I think it is generally recognized that the draft gear on our freight cars is at the present time the weakest part of our equipment. There are more railroad accidents resulting from broken draft rigging than anything else to-day, and it is time that more attention is given to it. I know that in this matter of drawbar attachments there is a great change during the last year in the sentiment among the railroads. The reasons of this are two-fold, I think. In the first place, when we had slower train speeds, lighter cars and lighter loads, we were able to use an inferior draft rigging attachment with comparative success; we were able to use without difficulty 1⅜ or 1½ in. bolts, and accidents from their breakage were not common. But now we run at a higher speed, and have 60,000-lb. cars and large locomotives, and the weakness of these parts has become more pronounced, so much so that some railroads are abandoning tail bolts.

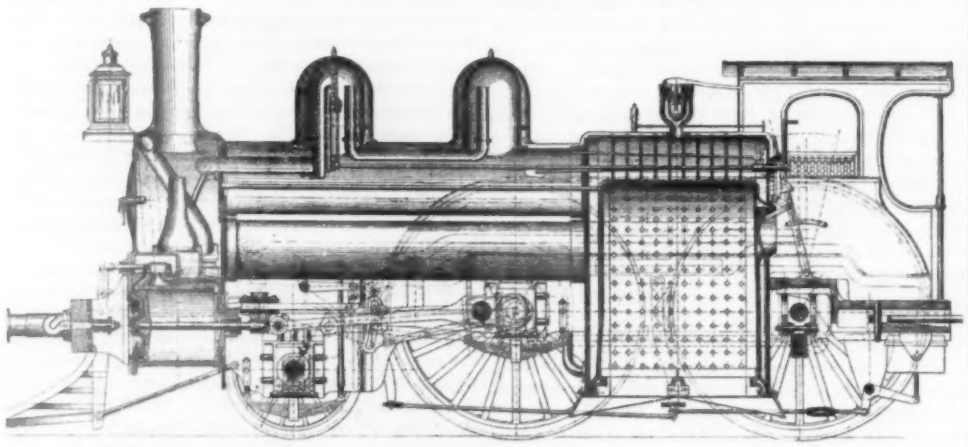
In reply to Mr. Schroyer, I would say, that all our cars fitted with the M. C. B. bar have the yoke attachment. Any failure of the M. C. B. bars is likely to be a little more serious than the plain bar. For that reason, these railroads who have been wedded to the tail bolt heretofore, are coming to the yoke. There is another thing to remember; you won't find any laboratory expert taking a bar to test and attempting to hold it with a bolt, even 2 in. in diameter. He realizes that it won't stand the test up to 120,000 or 130,000 lbs. They are always tested with something stronger in the way of a special bolt held with a clamp. That is the strongest possible argument for the use of a yoke. We ought to instruct our inspectors that it is criminal to put less than a two-inch bolt where the bar will take a bolt of that size.

A Triple Expansion Locomotive.

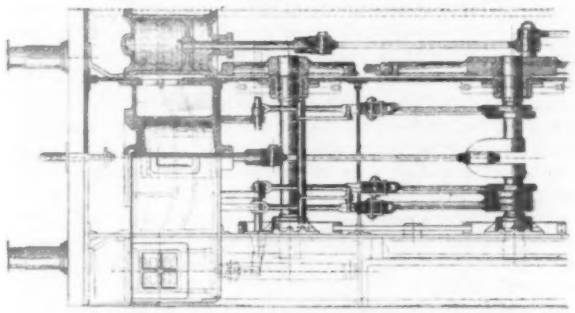
Mr. John Riekie, Engineer of the Northwestern Railway Company of Belouchistan, has designed a triple expansion locomotive, the general construction of which is shown in the accompanying illustration, which is reproduced from *Industries*. The following are the leading general dimensions:

High pressure cylinder, diameter	14 in.
Intermediate cylinder, diameter	20 in.
Low pressure cylinder, diameter	28 in.
Stroke of piston	26 in.
Diameter wheels leading	51 in.
Diameter driving wheels	95½ in.
Wheel base	16 ft. 2 in.
Length of grate	5 ft. 2 in.
Width of grate	4 ft. 1¼ in.
Grate surface	8 sq. ft.
Diameter top boiler shell	24 in.
Diameter of two bottom boiler shells	21 in.
Number of tubes	130
Diameter of tubes, outside	1.77 in.

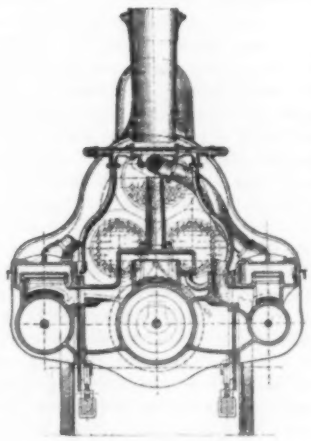
The three cylinders are arranged horizontally on the same level, the high pressure cylinder being on the left hand side, the intermediate cylinder on the right hand side, with the low pressure cylinder at the center. The steam for the high pressure cylinder is taken directly from the two domes, as shown. The high pressure and intermediate cylinders are double acting, but the low pressure is single acting. The boiler shell is composed of three separate cylinders joined together. The front dome has a valve which will admit steam to both the high and intermediate cylinders, to assist in starting.



SECTIONAL ELEVATION OF ENGINE.



PART SECTIONAL PLAN.



TRANSVERSE SECTION.

TRIPLE EXPANSION LOCOMOTIVE—NORTHWESTERN RAILWAY OF BELOUCHISTAN.

Designed by MR. JOHN RIEKIE, *Engineer.*

Intramural Road for the World's Fair Grounds.

The contract for operating a passenger railroad in the World's Fair grounds has been granted to the Western Electric Dummy Co., which is largely under control of the Thomson-Houston Electric Co. It is not generally known who are the other parties interested. There are nearly 600 acres in the grounds, and it is necessary to have a road to convey the people from one end to the other. The proposed track will make a complete circuit of the grounds. It will be an elevated structure, with no grade crossings. It will be double track, and trains of four or five electric cars will be run at intervals of a few minutes. Single trip fares will be 5 cents. The length of the track will be about five miles, with stations at intervals of 1,000 ft. The route mapped out is such that a passenger taking a train at the Midway Plaisance, can make the entire circuit of the grounds, both east and west, with a clear view of the buildings.

It seems that the plans proposed by the Thomson-Houston Co. for equipping the road are not quite satisfactory to the World's Fair management. The bid proposed to run trains of four cars, including the motor, with a total capacity of 320 passengers per train. The World's Fair officers asked for more power. The need for this is evident to anyone who will analyze the conditions, as the problem is identical with that of running an ordinary elevated road by electricity, and it is well known that no motor has yet been tested that is equal to such work.

The late Colonel Calvin Goddard, who built the "Alley" elevated road in Chicago, was called upon to present a plan for the operation of a satisfactory road inside of the World's Fair grounds. From his wide experience with suburban and city rapid transit, he prepared an extended report reviewing the different methods of transporting passengers, giving their cost and capacity. The report was presented to the World's Fair managers. His recommendation was the building of an elevated structure with wooden posts and rolled steel stringers of a form that would be useful after the fair was closed for the construction of buildings and bridges. He recommended the equipment of the road with five-car trains made of double truck street cars seating 46 passengers each, such as are now used on electric street railroads, with a motor on each car, all motors to be controlled from the head of the train. It is evident that in this way sufficient adhesion would be obtained as well as hauling power to accelerate the trains with the necessary rapidity to enable a good speed to be made over the line.

The fact is that when there is an almost unlimited amount of passenger traffic the problem of transporting passengers without interference of trains is a very complicated one, and it is only by running the cars in trains of four or five at least that any sort of comparative capacity is reached. The difference in the capacity of a road provided with five-car trains or single cars is about as 3 to 1; that is, more than three times the number of passengers can be carried per hour where five-car trains are used.

TECHNICAL.

Disagreeable Motions in Street Cars.

Persons riding in street cars will often notice extremely disagreeable side motions and thrusts which nearly throw them off their feet. Most persons consider these as accidental, but the fact is that they occur as a natural result of the design of the cars, and there are but few accidental motions of any magnitude or that produce any disagreeable effect. Curves in street railroad tracks are necessary, but they need not be the cause of throwing down passengers, as is often the case. The introduction of the electric system of propulsion has made it possible to run double truck cars at a comparatively low cost. Such cars are too heavy to be hauled by two horses. The difference in the motion of four-wheel cars and double-truck cars is very great. A diagram showing the path described in space by a passenger standing in a four-wheel car when it runs around a curve is quite different from a similar diagram taken on a double-truck car. In the latter the trucks are so near the ends that every passenger, whether on the platforms or in the centre of the car, will describe a nearly true circle, and there is only a comparatively small centrifugal force due to the velocity of the car around the curve to cause a disturbance; but in the four-wheel car only the passengers between the wheels or over them describe circles. Those on the platforms, which are usually extended a long distance beyond the wheel base, travel in a peculiarly shaped path like a broken line, and there is a change of direction of motion so sudden as to cause disagreeable side thrusts. For instance, a passenger on the rear of a platform when the car enters a curve will find the car under his feet moving suddenly toward the outside of the curve. Hence he will tend to fall inward. Under the same conditions the passengers on the front platform will find the car moving suddenly toward the inner side of the curve and they will tend to fall outward. This effect is particularly noticeable on cable lines where it is necessary for the gripman to hold the grip fast on the cable when passing around curves. The difference in the action of double truck and four-wheel cars on curves of cable roads is so well known to regular passengers that in trains of three cars the double truck vehicles are first filled. On the front or rear platform of long four-wheel cars with the ends overhanging the axles considerably, it is next to impossible to stand when a 15-mile cable car passes a moderately sharp curve, and it not infrequently happens that passengers are thrown from the platform of the four-wheel cars by reason of the erratic motion. It is the difference in motion of these two types of cars as much as any other consideration that has caused the introduction of so many eight-wheel cars in the last two years, and in cities like Milwaukee, where the comfort of passengers has been made a first consideration, the curves in the tracks are eased by transition approaches.

New Sound Steamers.

On May 9 the Providence & Stonington Steamship Company put in service on their New York & Boston route two new steel steamers, "Maine" and "New Hampshire," recently built by the Harlan & Hollingsworth Company, at Wilmington, Del. They are screw steamers divided by steel bulkheads without openings of any sort into seven water-tight compartments. The general dimensions are:

Length over all	310 ft.
Length on water line	302 ft. 7 in.
Beam molded on load water line	44 ft.
Width over guards	60 ft.
Draft	12½ ft.

The main saloon is 243 ft. long, in the clear, broken in the middle by the engine-house, and lined on both sides by staterooms, which are considerably larger than has been customary on Sound steamers. There are ten extra large parlor staterooms, with brass bedsteads. A notable addition to comfort is the placing of the dining-room, café, etc., on the upper deck.

The engine of these steamers is an inverted, direct acting, surface condensing, triple expansion engine with four cylinders, 28, 45, 51 and 51 ins. diameter, with 42 in. stroke. The propeller is of cast iron, left handed, four bladed, and 13½ ft. in diameter. Four Scotch type boilers are installed in each vessel. These are 13 ft. 6 in. in diameter and 11 ft. 6 in. long, and are made of steel, having a tensile strength of 60,000 lbs. to the square inch. Each boiler has three corrugated furnaces, 46 ins. outside diameter, with 274 sq. ft. of grate surface. The boilers will be worked at a pressure of 180 lbs. to the square inch.

The Rhode Island Compound.

The Committee on Science and the Arts of the Franklin Institute has recommended the award of the Elliott Cresson Medal to Mr. Clifford H. Batchellor, Chief Draftsman of the Rhode Island Locomotive Works, for his improvements in compound locomotives. The report of the Committee appears in the May issue of the *Journal* of the Institute. It is accompanied by an engraving of the Rhode Island, two-cylinder compound, and by two valuable appendices. The first gives a description of the types of engine built by the Rhode Island Locomotive Works under this design and reports of tests, with many indicator diagrams, etc. The second appendix contains an account of inventions and mechanisms devised by others for operating two-cylinder compounds.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Connecticut River Railroad Company, which for fifteen years has paid 8 per cent. to its stockholders and whose shares sell for about $235, needed some additional capital, and proposed to raise it by selling new shares at par to its stockholders. To do this it required authority from the Massachusetts Legislature. The bill giving this authority passed the Legislature, but Governor Russell vetoed it last Tuesday. The laws of Massachusetts practically limit railroad companies to dividends of 10 per cent. It is, however, discretionary with the state to say on what terms additions to the present railroad property may be made. If the state is satisfied that all additional facilities required will be provided without allowing so high a rate of interest on the capital required, it is its right to forbid additional issues on which 10 per cent. dividends are permissible, and it is the duty of the authorities to see that the best terms possible for the public are secured in granting authority to raise new capital. Doubtless the Connecticut River Company could raise the capital it requires now by an issue of bonds bearing about four per cent. interest. Whether it will find its advantage in so doing is another question, which the authorities should have considered and probably did consider. The right once granted to divide as much as 10 per cent. on a certain capital does not give the company any right to divide as much (if it can earn it) on all additional expenditures of capital which it may see fit to make. The limitations to be placed on the new capital form a new question, to be settled on its merits, precisely as the first issue was. Otherwise a company with capacity to earn say 20 per cent., but limited to 10 by law, might escape its limitation by absorbing non-paying stocks of equal amount and paying 10 per cent. on them. The limitation to 10 per cent. is a practical matter in Massachusetts, where several railroads have been able to earn more and actually have earned more and expended it in improvements, the benefit of which the public gets without any addition to the interest which it pays through fares and freights.

The last Union Pacific report contains an interesting statement of rail and tie renewals on each of its 22 lines for the past eight years, giving the amount of track on which rails were renewed with steel, with iron and with ties. Most of the branches and subsidiary lines have changed greatly in extent in that time, but the "Union Pacific Railway" has remained practically unchanged, at 1,822 miles. A little more than two-thirds of the rails of this system have been renewed since 1883, but 11 per cent. of the renewals have been made with iron rails. Meanwhile the ties were renewed $1\frac{1}{16}$ times, indicating an average life of ties of about $7\frac{1}{2}$ years. On the leased Oregon Railway & Navigation lines the rail renewals have been at the rate of $5\frac{1}{8}$ per cent., and the tie renewals at the rate of $10\frac{3}{4}$ per cent. yearly, compared with $8\frac{1}{4}$ and $13\frac{1}{4}$ per cent. on the Union Pacific system. The unfortunate St. Joseph & Grand Island, which finds it so hard to make a living, had renewals at the rate of only 2.55 per cent. of the rails, but of $11\frac{1}{2}$ per cent. of the ties yearly during the two years the Union Pacific has worked it. Its rails probably do not get much worn. The heaviest consumption of ties is reported on the line from Cheyenne to Denver, the old Denver Pacific, where it has been at the rate of $21\frac{1}{4}$ per cent. yearly, showing an average life of about 4.6 years, while on the Kansas Division (old Kansas Pacific) it was $10\frac{1}{4}$ years. The rails were also renewed $1\frac{1}{4}$ times on the Cheyenne Division, probably because iron, and perhaps re-rolled iron, was used for some of the first renewals. The Union Division (old Union Pacific), which has the heaviest traffic, has required lighter rail renewals than any other old line of importance, namely, $7\frac{1}{4}$ per cent. yearly, and this probably because it was already pretty well renewed with steel at the beginning of the period. On the subsidiary lines no less than 34,863 tons of iron rails have been used for renewals in the eight years, and only 78,056 tons of steel, which is probably to be explained by the use of iron taken up from the lines of heavier traffic for branches where the business is very light—a kind of road which is exceedingly common in most of the territory of the Union Pacific. At the end of last year all but $15\frac{1}{4}$ miles of the 1,822 miles of the "Union Pacific Railway" was laid with steel rails, but there were still 1,385 miles of iron in the 5,742 miles of the other roads, including more than half of the Omaha & Republican Valley lines, and five-sixths of the Kansas Central, which is a peculiarly atrocious property, whose working expenses are much larger than its gross earnings, and last year were nearly twice as great.

The standard code of train rules has lately been adopted by the Southern Pacific, and some extracts from the book, as it is issued by Mr. Fillmore, will be found on another page of this paper. The revisions and additions have been made with care, and the code as arranged by this company is noteworthy not only on that account, but also by reason of the fact that the circumstances of the road are somewhat peculiar. It has a very large mileage; much of this is in the most isolated portions of the country, while other parts, though not isolated from civilization, are isolated from the great body of American roads. These California roads having been independent pioneers their practice is likely to teach some things not to be learned from Eastern roads. The non-standard code, that part containing the rules on subjects not covered by the standard code, is as good as any such code that we have seen, with possibly two or three exceptions. The Pennsylvania's plan of making these rules very brief and devoid of detail still seems to us the best, however, unless a manager is willing to put into the work more time and the brains of more men than is generally done. The Southern Pacific has used air brakes on freight trains longer than any other road probably, and its air-brake rules have been prepared with much care. These form an important feature of the book. As the company had all its cars fitted with the common automatic brake the period of transition to the quick acting brake is characterized by circumstances (in connection with freight train running) somewhat different from those found on other roads where the air brake is being applied to freight cars; and it is therefore an unfavorable time to revise the rules. The first rule announces that the quick action brake is the standard of the road, and yet certain other rules and explanations are applicable or true only when the old automatic is used. The other rule books that have been discussed in the *Railroad Gazette* are given in the list below, with the dates of the papers containing the articles. (In reporting the Lake Shore & Michigan Southern code we omitted to say that rule 509 on that road requires the operator to repeat a train order twice, the second repetition being made after obtaining the siguatures to the order):—

Feb. 17, 1888		New York, Lake Erie & Western.
Feb. 24, 1888		
March 30, 1888		Fall Brook Coal Co.
Aug. 17, 1888		Wabash.
April 5, 1889		*Chicago & Northwestern.
Oct. 25, 1889		Pennsylvania.
Nov. 7, 1890		*Baltimore & Ohio.
Dec. 26, 1890		Chesapeake & Ohio.
Oct. 2, 1891		*Boston, Revere Beach & Lynn.
Dec. 11, 1891		Lake Shore & Michigan Southern.

*Not conformed to the Standard Code.

The Census on Water Transportation.

Water transportation is the subject of Census Bulletin No. 179, just issued. It is very brief, but covers one of the most important of the national industries. The bulletin gives the number, aggregate tonnage and value of steam, sail and unrigged vessels separately for the Atlantic coast, the Gulf of Mexico, the Pacific coast, the Great Lakes and the Mississippi Valley, the freight tonnage moved by each class in each district, the crews and their wages. Canals are to be reported separately.

The whole number of vessels of all kinds at the end of 1889 is given as 25,540, with an aggregate capacity of 7,633,676 long tons, and an aggregate value of $215,069,296—about equal to that of 4,500 miles of average railroad. The capacity of these vessels is about equal to that of 425,000 modern freight cars, while the number of freight cars in the country in 1889 was 1,011,232. The value of the vessels averaged $28.30 per ton of capacity, which is not very differen from the cost of freight cars.

But the vessels vary immensely in cost per ton, and the average is brought down by including a vast tonnage of flat boats and barges on the Mississippi and its tributaries. It will astonish most of us, probably, to learn that these craft form more than 40 per cent. of the total vessel tonnage of the United States, and that their average value is but $1.51 per ton of capacity! They have a larger average capacity, too, than any other class of vessels in the country, amounting to 502 tons, while unrigged vessels on the great lakes, which come next, average 453 tons, steamers on the great lakes 403 tons, steamers on the Pacific coast 321 tons, and steamers on the Atlantic coast only 293 tons. The latter average is evidently brought down by the great number of little steamers used chiefly for harbor transportation, and most numerous where there are the most industries and the largest and most numerous harbors. The average value of sailing vessels for the whole country is very nearly $32 per ton of capacity, or a little more than the value of freight cars, while they may be said to include in themselves motive power and road. The average value of steam vessels was $77.40 per ton, being $50 in the Mississippi Valley (river steamboats), $69 on the Great Lakes, $65 on the Gulf of Mexico, $89 on the Atlantic coast and $91 on the Pacific coast. Those gentlemen who are preparing to ship directly between Duluth and Liverpool will please bear in mind that the kind of steamer fit to sail the sea costs about 30 per cent. more than that which carries cargoes on the lakes, and that the ocean sailing vessels cost one-half more per ton than the lake sailer.

The aggregate tonnage of lake steamers is not one-fourth less than that of steamers on the Atlantic Coast, and is nearly one-third of the total steam tonnage (including river as well as sea and lake steamers) of the United States; but the sailing tonnage of the lakes is not one-ninth of the whole and not one-seventh that of the Atlantic Coast, which has 77 per cent. of the whole, and three-fourths more than its steam tonnage.

The statements of tonnage moved give a very imperfect idea of the transportation work done by the vessels, because we have no clue to the distance it was moved; and a barge engaged in transferring freight across the Hudson can carry more tons than the whole Atlantic fleet carries to Europe; but the figures reported are the only ones attainable, doubtless. The total tonnage reported is 172 millions of tons, one-fourth of which was carried by unrigged vessels, one-ninth by these vessels in the Mississippi Valley (chiefly coal, doubtless), and one-twelfth (14 million tons) in unrigged vessels on the Great Lakes (iron ore, coal and grain). The 600,000 tons of steamer capacity on the lakes is reported to have carried very little more than the 187,000 tons of sail capacity; which may seem a miracle to those who confound tonnage and transportation; but is not so difficult to believe when we remember that the sailing vessels are very largely engaged in the lumber traffic, much of which merely crosses Lake Michigan, or goes some other short distance compared with the chief steamer routes. This is shown also by the fact that the tonnage reported carried by the lake sailing vessels is equal to 103 full cargoes for them, and that carried by the lake steamers to only 58 cargoes. We take the liberty of doubting the accuracy of the reports of tonnage carried, however. That must be a very lively vessel, sailing or other, which makes 103 trips on the lakes during the seven months they are open, even if it only crossed Lake Michigan, and the sailing vessels usually go light one way. The tonnage carried by the whole fleet of the United States is reported as equal to $36\frac{1}{4}$ full cargoes for the steamers; $34\frac{1}{2}$ for the sailing vessels, and 11 for the unrigged craft. On the Atlantic coast it was $36\frac{1}{4}$ cargoes for the steamers, $27\frac{1}{2}$ for the sail vessels, and 17 for the unrigged craft.

The number of men employed on the national fleet is reported as 106,436, whose aggregate yearly wages were $36,867,305=$346 each. This must be a very difficult thing to ascertain, as crews are not employed permanently or for the season, and on the lakes they are laid off five months of the year. But the average wages per employé on the lakes is given as $335, or not much below the average, and more than on the Atlantic coast. The real sailor—the man serving on a sailing vessel—seems to be especially ill paid, getting on the Atlantic coast $269 per year., on the Gulf $237,

and on the lakes $313; but on the Pacific coast his average pay is $404 per year. The whole number of men employed on the vessels was a little more than one-seventh the number of railroad employés, 106,436 against 704,743.

Similar data have not been collected for the previous censuses, which prevents a comparison. Fishing vessels are excluded, as not being engaged in the business of transportation. There are nearly 7,000 of these vessels, and their industry will form the subject of a separate report.

The Union Pacific.

The Union Pacific Railway Company is a consolidation of the three principal subsidized Pacific railroads east of Ogden, the Union Pacific from Omaha to Ogden, the Kansas Pacific from Kansas City to Denver, the Denver Pacific joining these two between Denver and Cheyenne, and the short Leavenworth Branch of the Kansas Pacific. These form a symmetrical system of 1,822 miles of railroad, which for some time formed the chief part of the railroad system west of the Missouri, the chief outlets of Nebraska, Kansas and Colorado. These lines were well placed to secure the traffic of the country which they developed, but they had excessive capital accounts, and the Union Pacific did not begin to construct the lines needed to develop the fertile country in Nebraska north and south of its line until the best of the territory had been occupied by other companies. Subsequently, at a late period, it began making branches and extensions and it did so then as if to make up for lost time, but it was too late to secure the position which should have been held by the first line west of the Missouri.

These old lines, however, have long had a good traffic and large earnings. If their capital per mile were no greater than that of most other railroads that have been built within the same territory, they would be earning a large interest on it. The immense mileage of branches and extensions which have been acquired are mostly controlled by ownership of a majority, often nearly all, of their stock, and they have generally moderate capital accounts. The old roads now united under the name of the Union Pacific Railway, with 1,822 miles of railroad, are charged in the capital account at the rate of $85,244 per mile. On the other hand, the 5,850 miles of controlled roads which the company works have on the average $20,523 of stock and $24,116 of bonds per mile, of which the Union Pacific itself and other companies in its system own $13,096 of stock and $9,057 of bonds. But its income from these controlled lines and some other investments, which are reported to have cost $55,800,000, yielded a direct income last year of only $1,905,443, so that these investments do not now earn the interest on the bonds issued to pay for them.

This great subsidiary system has been acquired, of course, mainly to secure valuable traffic to the old main lines, though a considerable part of it is itself main line. Doubtless it effects this purpose, though the earnings by themselves do not indicate it. The tendency of the branches to increase greatly the business of the main lines has been offset by an enormous increase in competing railroads in most of the fertile country which the Union Pacific serves, and of competitors for the Pacific, Colorado and Utah through traffic. These have been taking away old business, while the branches were bringing in new business, and they have, moreover, caused a greater reduction in rates than would have occurred otherwise. The additions to the controlled system from year to year have been so great that a comparison of results on the whole system for several years has no great value. But a statement of mileage and net earnings for ten years exhibits clearly that something has worked very effectively against the beneficial effects of the additional mileage.

Year.	Miles.	Net earnings.	Year.	Miles.	Net earnings.
1882	3,633	$14,188,357	1887	4,823	$10,890,033
1883	4,121	12,484,863	1888	5,041	10,460,676
1884	4,420	10,789,175	1889	7,300	13,656,047
1885	4,474	9,687,441	1890	7,563	12,236,084
1886	4,509	8,867,972	1891	7,608	13,539,310

Thus the net earnings decreased as the mileage increased from 1882 to 1886, and with the great additions of the past three years, including a whole system on the Pacific coast with a trunk line to the chief port of Oregon, they have not yet reached the figures of 1882, though the mileage is more than twice as great as then. It would be an error to suppose, however, that the added 4,000 miles of railroad has been of no use. Without it the old system probably would have had a large part—very likely the larger part—of its old traffic taken from it, and have suffered just the same in rates, and have become a wreck years ago.

The old system of 1822 miles is to-day substantially what it was when first completed some 20 years ago. The principal facts in its history for the last ten years are shown below:

Year.	Train-miles. Pass.	Train-miles. Freight.	Millions of ton-miles. Pass.	Millions of ton-miles. Ton	Earnings. Gross.	Earnings. Net.
1882	2,519,036	6,717,790	157.5	732.8	$22,823,884	$12,096,735
1883	3,145,882	6,299,858	149.0	746.0	21,002,542	10,648,001
1884	2,675,847	5,220 365	142.7	748.2	17,837,041	8,941,909
1885	1,978,322	4,893,313	144.8	850.3	17,455 031	8,404 676
1886	2,236,197	4,922,106	194.9	966.2	17,896,133	7,522,707
1887	2,525,299	5,864,496	200.8	1,107.9	19,546,088	9,111,886
1888	3,258,513	6,469,541	207.7	1,216.1	19,898,817	8,119,468
1889	3,383,744	5,718,281	201.7	1,159.3	19,775,556	8,286,080
1890	3,909,809	6,615.813	204.6	1,248.7	20,438,208	7,274,759
1891	3,819,606	6,552,673	171.7	1,274.1	19,687,738	7,846.452

While we cannot trace the effect of the great system of feeders added to the system in the gross earnings, and much less in the net, it is shown very plainly in the traffic. The passenger traffic, to be sure, was only 9 per cent. more last year than in 1882, but last year was exceptionally bad for this traffic. Nearly all the gain in this traffic, however, came in a single year, from 1885 to 1886. The freight traffic was 74 per cent. larger last year than in 1882. It was substantially stationary for the first three years, and most of the total gain was made between 1884 and 1888—467 out of the total gain of 541 millions of ton-miles. As earnings have decreased instead of increasing, there has been a very large decrease in rates, and net earnings have been kept up as they were only by doing the business much more economically, than in the earlier years.

The great increase in traffic has been carried with comparatively a slight increase in expenses. The chief factor in this economy is indicated by the figures from freight train mileage, which were actually less last year, with 74 per cent. more traffic, than in 1882, the average train load having risen from 109 to 194 tons. The passenger train mileage has fluctuated in an astonishing way, the almost incredible reduction of 37 per cent. being shown from 1883 to 1885, with very little change in the amount of travel, while after the great increase of travel in 1886, the passenger-train mileage increased nearly 80 per cent. by 1890, while travel increased but 5 per cent., the average passenger train load, which was the remarkably large one of 87 passengers in 1886, falling to 51 in 1890 and 45 last year. The freight train mileage has about kept pace with the freight traffic since 1886, and the average freight train loads have ceased to grow, having been in tons:

1886.	1887.	1888.	1889.	1890.	1891.
196	189	198	203	189	195

The result shown last year on the whole Union Pacific of an increase in net earnings of $1,301,225 (10½ per cent. over those of 1890,) was in spite of a decrease of $349,661 in gross earnings. It will be interesting to see how the decrease of $1,650,886 (5½ per cent.) in expenses was made.

Under the general head of "conducting transportation" there was a decrease of $652,000 (6½ per cent.), under "motive power," a decrease of $743,000 (7½ per cent.), under "renewals of rails," a decrease of $370,000 (66 per cent.) and under "general expenses" a decrease of $125,000 (14 per cent.), and in car maintenance a slight decrease, while there was an increase of $227,000 (4½ per cent.) in maintenance of way expenses other than rail renewals and a small increase in taxes. Whether there was anything unusual in these changes will be best seen by comparisons for a series of years of cost of maintenance of way per mile, cost of motive power per locomotive, etc. These figures, it must be remembered, are for the whole system having an average of 7,668 miles last year.

The *cost of motive power*, which includes wages of engineers and firemen, repairs, fuel, etc., has been, *per locomotive*:

1886.	1887.	1888.	1889.	1890.	1891.
$9,442	$9,641	$9,086	$8,798	$10,129	$9,110

This expense was a tenth less last year than the year before, but more than in 1888 or 1889. The traffic was about the same in each of the last two years, an increase of 84½ millions of ton-miles being at least equaled by a decrease of 57 millions of passenger miles. The traffic affects these expenses less than train mileage, however, and with an insignificant increase in freight-train mileage there was a decrease of no less than 11 per cent. in passenger-train mileage. Per train mile, motive power expenses were 40⅜ cents last year against 41¼ in 1890. It is usually impossible when passenger traffic falls off to reduce passenger train service in proportion; but the Union Pacific did it, very nearly, last year. More than half of the decrease in motive power expenses from 1890 to 1891 was in cost of fuel, which was reduced more than 10 per cent., the chief factor in which was the reduced train mileage, assisted by a reduction of 8¼ per cent. in the cost of coal per ton.

The cost of *maintenance of cars* has been, per car:

1886.	1887.	1888.	1889.	1890.	1891.
$109	$108	$113	$107	$105	$107

These expenditures have been remarkably uniform. The difference in the cost of maintenance between freight and passenger cars is of course very great, but the passenger cars are a very small fraction of the whole stock—one in 35.

The total cost of *maintenance of way* (except rail renewals) has been, per mile of road worked:

1886.	1887.	1888.	1889.	1890.	1891.
$831	$702	$689	$685	$668	$836

The cost per mile was thus larger last year than in any of the four previous years, but much less than in 1886. The chief changes from 1890 are a large decrease (66 per cent.) in track renewals, and a large increase (50 per cent.) in tie renewals.

The cost of *rail renewals* has been meanwhile per mile:

1886.	1887.	1888.	1889.	1890.	1891.
$121	$55	$89	$42	$71	$23½

These, we see, have fluctuated in an extraordinary manner, and last year fell to the ridiculous sum of $23.50 per mile—not one-fifth what they were in 1886, only one-sixth more than the cost of spikes and rail fastenings, and not two-thirds of one per cent. of the total working expenses. It should be said that in these days rail renewals have become generally an insignificant part of railroad expenses. Ties on the Union Pacific cost several times as much as rails, the expenditures therefor (included in "maintenance of way" above) having been, per mile:

1886.	1887.	1888.	1889.	1890.	1891.
$124	$156	$170	$163	$169	$115

Thus last year tie expenditures were one-half greater than in 1890, but only about equal to the average of the three years previous. It may be remarked that the aggregate expenditure of the Union Pacific during the past six years has been $5,063,208 for tie renewals, and only $2,203,387 for rail renewals.

Not only is the old system—the 1,822 miles of subsidized lines now united as the Union Pacific Railway—much the most profitable part of the system, though it has less than a fourth of its mileage, but the line from Omaha to Ogden, the original Union Pacific, is much the most profitable of the subsidized lines. Its net earnings last year were 77.7 per cent. of the net earnings of the 1,822 miles of the "Union Pacific Railway," and 45 per cent. of the total net earnings of the 7,688 miles of the Union Pacific system. Gross and net per mile the earnings of the different parts of the Union Pacific Railway were:

	Miles.	Earnings per mile. Gross.	Earnings per mile. Net.
Union Division (Omaha—Ogden)	1,043	$14 130	$5,845
Kansas Division (Kansas City—Denver)	643	6,148	2,305
Leavenworth Branch	32	2,615	416
Cheyenne Div. (Cheyenne—Denver)	104	8,788	2,480
Whole Union Pacific Railway	1,822	10,806	4,707

These lines are the trunks over which passes the traffic of most of the others. The figures for the aggregate of all the rest of the system are,

Miles.	Earnings per mile. Gross.	Earnings per mile. Net.
5,846	$3,936	$974

There is nothing unusual about this, but the difference between trunk lines and branches is not usually appreciated sufficiently. Parts of the Union Pacific subsidiary lines are trunk lines, it is true, notably the long line from Granger to Portland, Ore. On the Union Pacific Railway (1,822 miles), the working expenses and taxes were but 60 per cent. of the earnings; on the rest of the lines they were 75 per cent. The traffic on the old lines last year was equivalent to 129 and 935 tons of freight each way daily over the entire 1,822 miles—which may be said roughly to be 2½ car loads of passengers and 47 car-loads of freight. The actual train movement employed to carry it was equal to 2.85 passenger trains and 4.925 freight trains each way daily. The passenger traffic on the other 5,846 miles was almost exactly equal to that on the above 1,822 miles, and so was equivalent to only 40 passengers each way daily; and the freight traffic was not quite as great on the 5,846 as on the 1,822 miles, and at the rate of only 267 tons each way daily—say 13 car-loads. The thinness of the traffic on these lines sufficiently explains their comparatively high rate of working expenses.

The average rates received on the 1,822 miles of the Union Pacific Railway were 2.147 cents per passenger mile and 1.093 cents per ton mile; on the rest of the system, 2.794 cents and 1.49 cents. The expense per ton and passenger mile on this subsidiary system is fully as great as the receipt on the old system. With the higher rates we have seen that it yields directly less than one-fourth as much net earnings per mile.

The lines leased to the Union Pacific by the Oregon Railway & Navigation Co., which give it an independent outlet to the Pacific, have never been directly profitable to the lessee. The loss on them to the Union Pacific during every year has been as follows:

1887.	1888.	1889.	1890.	1891.
$18,083	$349,118	$736,859	$1,789,120	$1,126,949

The Union Pacific pays as rental, besides the fixed charges, $1,440,000 as dividends on the stock; thus the Oregon Company's property has always earned more than its fixed charges, except in 1890; but its surplus since the lease has averaged but $2.66 per

share of stock, instead of the $6 which the Union Pacific has had to pay. The great fleet of river and ocean steamers of the Oregon Company, which in its early years were its chief profit earners, are reported not to have earned their expenses in either of the last two years. With $1,337,673 of gross earnings last year they netted a loss of $80,630.

The financial difficulties of the Union Pacific are due to the excessive capital of the subsidized lines. If other companies had kept out of the field, it doubtless could have paid interest and dividends and provided for the debt to the government now soon to become due. But other lines have been built at low cost all over its more fertile territory, and there are several competitors for the through traffic which it long had all to itself. It must carry as cheaply as its cheap competitors do, and always will have to. The immense mileage of subsidiary lines, mostly cheap, bring down the average capital per mile for the whole system to something like resonable figures; but then its rivals have built, or can build, cheap extensions and branches, too, and have the further advantage of cheap main lines. The Union Pacific is not the only sufferer from this, and the approaching completion of the Manitoba to Puget Sound will tend to increase the number and the suffering. But the country on most of the Union Pacific lines is new, and though most of it is not fertile, it doubtless will grow greatly yet in population and traffic. How much good this will do the Union Pacific depends a great deal upon what other railroad companies do. It can hardly be hoped that the territory on the new lines will grow as Kansas and Nebraska have done in the last ten years; yet we have seen that this great growth did not increase the profits of Union Pacific.

Open warfare rather than secret, seems likely to be the rule in the passenger business the coming season, thanks to a few bold managers, who believe in delivering a hard blow the first time. The Atchison, Topeka & Santa Fe, which some weeks ago took action to stop the absurd $20 commission on tickets to California, has now taken an equally radical step in reducing the August excursion fare to Denver for the Knight Templars to less than one-fourth the regular rate, as was announced in our traffic columns last week. The public seems to be sure of getting all the favors it deserves, even if its philanthropic protectors, the scalpers, are somewhat abused by the railroads. The abusing process does not seem to flourish greatly at Chicago, however. The Pennsylvania lines now issue a mileage book (1,000 miles at 2 cents a mile), which is good from Chicago to Philadelphia, thus making the fare between these points $16.45. This, added to the local fare Philadelphia to New York, makes a total of $18.95, which is $1.05 less than the regular through rate. As a book can be nearly used up on a single trip the competitors of the Pennsylvania are not without some ground for regarding this action as a sharp snap of the whip at their heels. Another case of radical cutting is the $13 rate from Pittsburgh to Minneapolis and back for the Republican National Convention. This rate is not an open one, but there seems to be little doubt that it has been made. An incident of this Minneapolis business illustrating a change in the conditions due to the growth of the country and the rapid increase in the size of crowds on important occasions, is the complaint of some of the roads that all the available storage tracks at Minneapolis have been secured by the Chicago, Milwaukee & St. Paul and the Chicago, Burlington & Northern roads. The tracks adjacent to the convention grounds are owned by the Great Northern, which is said to have leased all its available side tracks to the two roads named, giving them a great advantage over their competitors, as many of the delegates will sleep in the cars during the convention. The Burlington, which is understood to have secured the lion's share of the Denver excursion business several months ago, seems to have had a similar advantage there, if we may believe its maps; they indicate that there is no good place within 500 miles of Denver where a sleeping car can stand, except on tracks in the Burlington yard, and the road between that yard and the meeting place of the Knights is down hill both ways.

The Union Pacific, on April 1, put into use throughout its system a new set of local tickets, the general plan adopted being the same as that in force on the Chicago & Alton. Each ticket has a list of stations arranged alphabetically along the whole length of one side, and it can be used to any one of the stations named. Each selling office requires as many forms as it takes to contain the names of all the stations on the road printed in type about the size of this. On the Alton only six forms are necessary for all the single trip one-way tickets. The features of the Union Pacific ticket are similar to those of Alton form A C, described in the *Railroad Gazette* of Jan. 22 last, except that the station to which the ticket is to be used is not indicated by a punch mark, but by a special cutting device, somewhat like that used with Thrall's simplex ticket, which was described in the *Railroad Gazette* Nov. 8, 1889. The stub, which has a list of stations parallel with the list on the ticket proper, is torn from the latter by a special cutter, which separates the parts in such a way that a notch is cut out against the desired station. The principal difference between this and Thrall's device is that the latter effectually cancels every name on the ticket except the one intended to be used. The triangular notch in the edge of the Union Pacific ticket would probably be harder to obliterate by pasting than would the ordinary punch hole. Baggage punches are not to be used on these tickets, on the Union Pacific. The baggage man simply gouges out, with his thumb nail, a semicircular piece from one end of the ticket, as in other well known forms of tickets, the semicircle being indicated by a perforated line. These Union Pacific tickets are called the Lomax tickets, and both ticket and cutter are patented, though it is not very easy for the ordinary mind to discern the patentable difference between this and the other tickets referred to above.

The action of the House of Representatives on Tuesday of last week in striking out the item appropriating $65,000 for the Inter-Continental Railway Commission from the Diplomatic and Consular Appropriation bill was probably wise, but it is also probable that the members voting against the appropriation were wiser than they knew. Patriotic interest in the valuable work which the Commission has been doing seems to have been wanting in the opponents of this enterprise. The surveying parties now in the field have completed their reconnaissances through the least known portions of any future route through Central and South America. Having done this much it is best that they should come home and report. The information they have obtained concerning the feasibility of railroad construction, the topography, climate, productions and general commercial opportunities of the regions traversed should be published and disseminated as widely as possible. The resulting stimulus to American enterprise in those countries would be reward for the outlay in undertaking these surveys. Then if the outlook a few years later should encourage it, a second expedition could be sent to go over the work more carefully, which would have the benefit of the data secured by the first expedition, and the advantage of a later judgment as to the necessities of a commerce which is now in a formative state in considerable portions of the southern republics. We fear that the zeal of certain advocates of a great inter-American railroad, in wishing to assume too great responsibilities for the future, has brought disfavor upon the whole affair, and to a large extent blinded the public to the true value of the labors of the commission.

The question of raising the Illinois Central tracks between Forty-seventh street and a point beyond the World's Fair grounds, is now the most important one which the World's Fair officers, the City of Chicago, and the Illinois Central road, have to consider in connection with the World's Fair transportation. The difference between raising the tracks and not raising them is a difference of more than 50 per cent. in the capacity of the road to carry visitors to the grounds. If the tracks are not raised, the only method of operation by which the grade crossings can be used for carriages and the tracks used for suburban and other trains for the Illinois Central and several other roads running over the Illinois Central tracks, is to allot to each a certain definite time of right of way; that is, for a certain number of minutes the crossings will be open for carriages, and the succeeding interval will be closed to permit the passage of trains. Those who are familiar with the operation of railroad trains under such limited conditions know very well that this means an interference with traffic that would cut down the capacity of the road enormously. The aldermen of the city seem to be inclined to impose upon the Illinois Central stipulations which it cannot accept, but on the other hand the city certainly should not pay for the raising of the tracks, and neither should the World's Fair management. There will be some suits for damages resulting from the raising of these tracks, if it is done, as it is intended to build a wall in front of the adjacent property, between the road and the lake. A new ordinance has been presented to the City Council with several amendments intended to hold the Illinois Ceneral road responsible for all damages. This ordinance will be acted upon at the next meeting of the Council.

The exigencies of politics or of business competition, or both, are making trouble, apparently, in railroad matters in New South Wales. The recent fatal accident at Bathurst, in which nine persons were killed and 11 injured, is said by the local papers to have been caused by a Baldwin locomotive which bent the rails. Later reports state that it was due to a broken rail, and that a great outcry has been raised against the railroad administration because the rail is said to have been 20 years old. A further complication has arisen in the shape of serious charges made against Mr. Eddy, the Chief Commissioner of Railways. The main allegations in these charges are that Mr. Eddy has acted in collusion with English firms in purchasing locomotives for the State railroads: that the reports of his department have been misleading and untrue, and that a large number of officials have been removed to make places for his personal friends. A Commission has been appointed to inquire into these charges, and the same Commission will investigate the further charges that money voted for State railroads has been misspent through the gross incapacity of the Commissioners. It is probable that all of these charges should be heavily discounted. All that we have ever heard before of Mr. Eddy goes to prove his integrity and ability.

The Rio Grande Western has lately accelerated the schedule of one of its through trains, and in following the fashion it has to include all the details, as we learn by an item in a Salt Lake paper to the effect that the General Superintendent has issued circulars announcing that passes will not be honored on the limited fast train, except in the case of general officers of the road or heads of departments. The hauling of official cars on this train is prohibited. All of which is well enough, provided the superintendent finds himself equal to the perplexing task of justly drawing the line between "heads of departments" and the other fellows who, though they be nothing but arms, or legs or tails, still wish to travel as fast as any one else. The circular calls to mind a recent story about a general manager who received an exchange annual pass stamped in big red letters, "Not good on trains 3, 7, 11, 15, 4, 8, 12," and so on. He reciprocated by sending a pass endorsed "Not good on any trains."

NEW PUBLICATIONS.

The Journal of the Iron and Steel Institute (London), 1891. New York and London: E. & F. N. Spon.

Those of our readers who keep close watch of the literature of iron and steel are probably familiar with the annual publication of the Institute "Journal," which is always an important event. The present volume contains a paper by Sir Henry Bessemer on the "Manufacture of Continuous Sheets of Iron and Steel direct from Fluid Metal," and several other papers of less general interest. Two hundred and twenty-five pages are given to the "Notes on the Progress of the Home and Foreign Iron and Steel Industries," which is a valuable part of this Journal, and the usefulness of the book is much increased by a good index.

Journal of the Franklin Institute. May, 1892.—This issue has an unusually important table of contents. The papers are: "The Development of American Armor Plate," "The World's Fair," "A Practical Consideration of Compressed Air," and "Cellulose or Wood Fibre." Forty-six pages and many plates of engravings are given to the report of the Committee on Science and the Arts, recommending the award of the Elliott Cresson medal to the Rhode Island two cylinder compound locomotive.

Tests of the Drexel Car Coupler.

G. W. G. Ferris & Co., of Pittsburgh, have recently made tests of some cast steel Drexel car couplers. The following are the results:

Drop tests with 1,640 lb. drop, April 27, 1892.

First Test—Steel Head and Knuckle.

	Drop.	Deflection.
1st blow	10 ft.	.....
2d blow	10 ft.	¼ in.
3d blow	10 ft.	¼ in.
4th blow	15 ft.	⅝ in.
5th blow	15 ft.	⅝ in.
6th blow	18 ft.	⅝ in.
7th blow	20 ft.	0 in.
8th blow	25 ft.	⅞ in.

Very slight fracture was developed on the 4th blow, but did not increase with succeeding blows. Pin hole in bar elongated to measure 1⅝ in. × 1⅛ in., but knuckle could be opened and shut after each blow. The lock in knuckle was uninjured. After the 8th blow the shank of the bar was bent to a curvature of $\frac{7}{32}$ in. from its normal condition.

2d Test.—Guard arm test allowing the 1,640 lb. weight to drop from the height of 10 ft. upon the guard arm of steel bar, breaking shank of bar.

2d Guard Arm Test of Steel Head.

1st blow of 10 ft. No damage to bar.
2d " " about 8 ft. Accidental blow, no damage to bar.
3d " " 15 ft. No damage to bar. Broke machine on 3d blow.

May 2, 1892.

First Test of Steel Bar and Knuckle.

	Drop.	Deflection.
1st blow	10 ft.	¼ in.
2d blow	10 ft.	⅝ in.
3d blow	10 ft.	⅝ in.
4th blow	15 ft.	⅞ in.
5th blow	15 ft.	1 in.
6th blow	18 ft.	Broke.

Slight fracture was developed on the 3d blow at back of head. Fracture increased with each succeeding blow until back of bar was broken out at 6th blow.

The knuckle and key were not injured and knuckle could be opened and closed after each blow. The pin hole elongated to measure 1⅝ × 1⅛ in.

Second Test of Steel Bar and Knuckle.

	Drop.	Deflection.
1st blow	10 ft.	⅝ in.
2d blow	10 ft.	⅞ in.
3d blow	10 ft.	1⅛ in.
4th blow	15 ft.	1 in.
5th blow	15 ft.	1⅜ in.
6th blow	18 ft.	Broke.

Slight fracture was developed in the 3d blow at back of head; fracture increased with each succeeding blow. Head of bar was broken from the shank on the 6th blow at 18 ft. Shank of bar was bent to a curvature of ½ in. from its normal condition. Knuckle and key were not injured. Pin hole in knuckle elongated to measure 1⅝ × 1⅛ in. Fractures of metal *good*.

On the 11th of last November tests were made of this coupler by the same firm, as follows: In making the physical test of bar and knuckle we had the misfortune to break one of our wedges of the machine, which delayed the work some time. The physical test of this bar and knuckle stood 151,000 lbs., and we were not able to break it with our machine. The capacity

of the machine is supposed to be 150,000 lbs., but we ran it 1,000 lbs. beyond the capacity and there was no sign of any break.

Drop test with a 1,640-lb. weight, and pulling test made on the Emory Testing Machine, capacity, 150,000 lbs.

Drop Test.

No. of blow.	Weight.	Height of drop.	Deflection.
1	1,640 lbs.	8 in.	7/8 in
2	"	10 in.	Not measured.
3	"	15 in.	1 in.
4	"	20 in.	1 7/8 in.
5	"	25 in.	Not measured.
6	"	28 in.	.....

The deflection on the 28-in. blow could not be measured on account of the bar breaking. The pulling test of bar stood the strain of 121,000 lbs., showing very good results, and the break occurring in the upper lug at knuckle.

The proposed standard tests, which were as outlined at Pittsburgh, were given in the *Railroad Gazette* April 29, 1892. The requirement under a drop test with a 1,640-lb. drop is three blows at 10 ft. and two blows at 15 ft. No standard test has been proposed for the guard arm. The proposed standard requirement under a pulling test is 125,000 lbs. These results of tests made of a vertical plane coupler indicate that the proposed standard requirements are not too severe.

TECHNICAL.

Manufacturing and Business.

The John A. White Co., of Dover, N. H., has recently bought out the business of the Concord (N. H.) Machine Co., acquiring the good will of the concern and its patterns and stock. Part of the company's men and all of the machinery will be removed to Dover. Mr. E. F. Gordon, inventor and designer of wood working machinery, will devote his entire time to the interests of the John A. White Co., and give special attention to the design of novel wood working machinery, which the company will soon put upon the market.

Copeland & Bacon, of New York, builders of hoisting engines, have opened a branch store at 62 South Canal street, Chicago.

The Ingersoll-Sergeant Drill Co., of 10 Park place, New York, has opened a branch office under the firm name of Parker, Melcher & Ingraham, 100 West Washington street, Chicago, where a complete outfit of its machinery, such as air compressors, channelers, rock drills and all other mining, tunneling and quarrying machinery, with duplicate parts, will be kept in stock.

New Stations and Shops.

The Berlin Iron Bridge Co. has received the contract for the new rolling mill which the Waterbury Brass Co., of Waterbury, Conn., will build to replace the one lately destroyed by fire. The building will be 150 × 350 ft., with brick side walls and iron roof trusses covered with the Berlin Bridge Co.'s patent corrugated iron roof covering.

The Baltimore & Ohio Railroad is building a new locomotive repair shop at Grafton, W. Va., on the site of an old shop that was torn down a few weeks ago.

The Duluth & Iron Range will build an eight stall addition to the roundhouse at Two Harbors, Minn.

The Union Bridge Company.

This firm issues a circular to say that on the first day day of May, 1892, General Geo. S. Field retired from the copartnership known as the Union Bridge Company. The business will be continued, under the present name, by the remaining partners. Either member of the old firm will sign in liquidation of unfinished contracts. General Field desires it to be understood that his "good will" remains with his former partners.

Locomotive Tests.

Mr. F. W. Johnstone, Superintendent of Motive Power of the Mexican Central Railway, has in progress some extensive locomotive tests. So far the compound locomotive has shown a decided advantage over simple engines. The tests are being made under the supervision of an engineer of tests from the office of Mr. D. L. Barnes, Chicago. The apparatus used consists of a new dynamometer car built by Mr. Johnstone, Thomson water meters, Boyer speed recorders, calorimeter, pyrometer and all other apparatus that is now generally used in making thorough locomotive tests.

The Mechanical Engineers.

The members of the American Society of Mechanical Engineers on the way to the San Francisco meeting stopped at Chicago on the 5th inst. to look over the World's Fair grounds. They arrived at 2 o'clock p. m. and left at 7. A number of the members of the society living in Chicago met them at the grounds.

Duluth & Iron Range Ore Dock.

The ore dock at Two Harbors, Minn., will be turned over to the road about May 15. It is expected that the increased facilities will raise the amount of ore shipped from this point during 1892 to 1,000,000 tons.

Tests of Car Couplers.

Tests were made a few days since of the Perfected Car Coupler, J. A. Hinson, patentee, by the Solid Steel Company at Alliance, O. A pulling test of the coupler did not break it at 125,000 lbs., and it stood without fracture three blows at 10 ft. and two blows at 15 ft. A guard arm test was not made. The above tests correspond to the standard suggested by the M. C. B. committee.

On May 2 three California couplers were taken from stock and tested at Alliance, O. The couplers are made of steel, both shank and knuckle. They were pulled to 110,000 lbs. without the slightest indication of injury. Under the drop tests they stood three blows at 10 ft., three blows at 15 ft., one blow at 18 ft., and were not broken. These drop tests were more severe than those suggested by the M. C. B. committee.

The Chicago Elevated Railroad.

The locomotives for the "Alley" elevated road in Chicago have been put on the track and steamed up. A trial has been made over the line, and it was found that the clearances were satisfactory. The cars have arrived in Chicago, and will be run over the structure this week. The opening of this road will take place before the first of June, and after that trains will be run on a time-table varying from 2½ to 10 minute intervals.

THE SCRAP HEAP.

Notes.

Two men convicted of robbing freight cars were sentenced to six years' imprisonment at Jersey City, N. J., last week.

The Illinois Railroad Commissioners have approved a new interlocking plant on the Michigan Central, near Kensington, Ill.

A large freight house and storeroom of the Philadelphia & Reading was burned at Philadelphia on the night of May 7. Loss about $80,000.

Congressman Scott, of Illinois, has introduced a bill in the House placing sleeping car companies under the provisions of the Interstate Commerce Law.

On the morning of May 6, the shops of the Northern Car Co., near Minneapolis, were burned down, together with a large number of cars. This concern made street cars chiefly.

An investigation of the Philadelphia & Reading Railroad consolidation was begun in the House of Representatives at Washington, last week, but it does not appear that any progress has been made.

The Kansas Railroad Commissioners report that citizens along the line of the Atchison, Topeka & Santa Fe have complained that a considerable number of telegraph offices [stations?] have been closed by the road.

Foreign Notes.

The Cape Railway is now so far advanced that the opening of the line to the Vaal River by the middle of next month is regarded as certain.

Colonel Wendrich, Overseer of Grain Transportation to and in the distressed provinces, has been appointed Inspector of the whole system of Russian railroads.

A decree permitting the export of oats and corn from Russia will be published this week, and another decree permitting the export of wheat will be published three or four days later.

An electric bleaching plant, the first of its kind in Scandinavia, has been established at Uddehalen in connection with a paper mill at that place. The results of the experiment are said to have been highly satisfactory.

The Minister of Railways in Victoria has begun to carry out his scheme of retrenchment, reducing the train service by 500,000 miles per annum. This is estimated to save £50,000 per annum. This is part of the plan to save operating expenses by reducing service of which we spoke some weeks ago.

As an interesting news item, the *Moniteur Industriel* mentions the fact that the Elmore process for electrolytically depositing copper in the manufacture of tubes, wire and sheets is now being worked at Dines, in France, by a French company who have acquired the Elmore patents for this purpose. The general features of the process are too well known to require explanation here.

Russia recently had its first meeting of water-works superintendents and engineers, those in attendance having comprised members of municipal as well as private water-works. The object of the meeting apparently was the organization of a water-works association on much the same plan as of those which we have in this country, with meetings to be held for the reading and discussion of papers, and the general interchange of data of professional interest.

The general manager's report on the government railroads in Natal in 1891 states that the revenue, £572,296, shows a decrease of 5.67 per cent., while the working expenditure, £372,023, a decrease of 10.65 per cent. The net revenue amounts to £4 8s. 6d. per cent. on a capital of £4,528,242. The average interest paid by the colony on railroad account is 4 per cent., so that the railroads not only earned during the year their working expenses and interest, but added £19,144 to the revenue of the colony.

Spanish-American Notes.

A concession to erect a refinery of petroleum has been asked for by Messrs. Francisco Doll & Co., of Buenos Ayres.

The Department of Engineers in Argentine has drawn up plans for the construction of a bridge over the Rio Quinto, near the city of Mercedes, estimated to cost $20,000. An appropriation of the sum necessary has been asked.

Agitation on the part of people living on the Isthmus of Panama to have the completed portion of the Panama Canal thrown open to public use has resulted in the Colombian government removing the chain which obstructed the entrance at Colon. The canal company has entered a protest against this action of the authorities.

The Argentine railroads are threatened with a new danger in the form of provincial taxes. According to the laws under which the guaranteed roads received their charters they were exempt from national, provincial and municipal taxes for 50 years. The action of the province of La Plata in imposing a tax upon these roads is consequently illegal, but the government gives further evidence of its disfavor towards the guaranteed railroads by taking no cognizance of this infringement of their rights. Should this precedent become established during the present hard times it would bankrupt all these roads.

The renewed commercial activity in Paraguay, with the increased influx of colonists, gives fresh interest to the railroad problems which concern the people of that republic. The Central Railroad, which was partially opened to traffic in 1864, and later extended to the important town of Villa Rica, 92 kilometres from Asuncion, is now in operation as far as Yuti, 50 kilometres beyond Villa Rica. It is intended to complete this road to Villa Encarnacion, on the Upper Parana, 150 kilometres from Yuti, where it will make connection with the Monte Caseros-Posadas branch of the East Argentine Railroad, now in process of construction. The Paraguay Central road, originally built by the government during the days of the elder Lopez, has been purchased by an English company, and under the new management has begun to make money. Asuncion is an important port of entry for Bolivia; quantities of merchandise being transported by mule back and ox-cart from this point some two hundred miles and more into that republic. This has led to a project for building a line from Puerto Pacheco, on the Rio Paraguay, to La Paz, Bolivia, 750 kilometres, the first section of which is now under survey. There also seems reason for believing that the Asuncion-Villa Igatimi section of the proposed trans-Paraguay-Brazilian road will be built under the concession to M. Obert de Thiensis, which accords a 6 per cent. interest guarantee for 30 years upon the capital invested.

World's Fair Notes.

The Salt Manufacturers' Association of Michigan will show models of all salt making apparatus used from the earliest days down to the present time.

The upper Michigan peninsula has applied for 20,000 sq. ft. of space to be filled with an exhibit of mineral and timber products. The principal mineral exhibit will be native copper.

There are now over 6,000 men working on the Exposition buildings. Some of the work goes on night and day; 54,875,800 ft. of lumber out of 75,560,000 ft. necessary for the buildings has been put in position.

A Woman's Dormitory Association has been formed, the object of which is to furnish cheap and comfortable living quarters for women, particularly those of the industrial classes. Four huge dormitories will be erected. The site for one of them has been given by George M. Pullman. It is about two and a half blocks from the northern entrance to the grounds. The building will be about 4 0 × 150 ft., in eight sections, so that there will be no inside rooms. It can accommodate 1,200 women. The rooms will be rented for about 30 cents per day.

The war between the Illinois Central and the Baltimore & Ohio roads about a grade crossing at the World's Fair grounds is at an end, and as a result the switching charges are 3 cts. per 100 lbs. for exhibits and 1½ cts. per 100 lbs. for structure, or $5.00 per car. The battle was not between the Baltimore & Ohio and the Illinois Central wholly, but was mostly between the World's Fair managers and the Illinois Central. The Baltimore & Ohio took up the fight for its own advantage. The Baltimore & Ohio pays $30,000 to the World's Fair corporation for the right of way into the grounds. All roads entering Chicago can now pass over the Baltimore & Ohio tracks by paying a reasonable charge for trackage. The amount may in case of dispute be fixed arbitrarily by the President of the World's Fair, and from his decision there is no appeal.

The Soo Lake Terminal.

The docks, elevator and warehouse, which were destroyed by fire have been nearly all replaced. The company is rebuilding the coal dock which, when completed, will have a frontage of 800 ft., and will be 500 ft. deep. There has already been finished 300 ft. of this dock. Barnett & Record, of Minneapolis, have completed the 400,000 bushel elevator, and have the contract for an electric lighting system and a water service plant for protecting the property. The elevator is provided with three conveyors for loading vessels, each having a capacity of 1,200 bushels an hour.

The Portuguese African Railroad.

The Trans-African Railroad, which has its starting-point at St. Paul de Loanda, has been opened for traffic as far as a point near Cazengo, a distance of 140 miles.

The Ontario & Western Coal Dock at Newburg.

Ross & Sandford, of Jersey City, have now completed a very considerable part of the bulkhead being built for the New York, Ontario & Western, at Cornwall, N. Y., on the Hudson River. The work was begun on April 1, and is to be entirely completed by Aug. 1. The bulkhead will be 700 ft. long, and will require about 75,000 cubic yards of dredging. The coal dock and trestle for transferring coal from the cars to vessels will be about 800 ft. long and 50 ft. wide. The entire work is estimated to cost $125,000.

Nicaraugua Canal Directors.

At a meeting of the Nicaraugua Maritime Canal Company in New York, last week, the following directors were re-elected: ex-Judge Charles P. Daly, Rear Admiral Daniel Ammen, Horace L. Hotchkiss, ex-Judge Henry E. Howland and Senator James B. Eustis.

The Disaster at Revere, Mo.

An eastbound through passenger train of the Atchison, Topeka & Santa Fé broke through a trestle bridge near Revere, Mo., about 2 o'clock on the morning of May 5, and seven passengers were killed. About 25 others were injured, together with five trainmen. There was a severe rain storm and the stream was very high, but the bridge seems to have shown no signs of weakness, as the reports state that the engineman ran upon it at a very low speed. The engine got across all right, but all the rest of the train except the rear car fell through, about 25 ft.

The Floods in Illinois, Iowa and Missouri.

Press dispatches of May 5 reported serious damage by heavy rains at Joliet and Ottawa, Ill.; Des Moines and Burlington, Ia.; Topeka and Atchison, Kan., and many smaller places throughout that region. The most serious losses seem to have been highway bridges washed away. Numerous washouts of railroad track are reported, but in nearly every case the reporter seems to have relied on very indefinite information. On Sunday, May 8, the rain continuing, further reports of the same kind came in, including some from Fort Wayne and South Bend, Ind. On May 10 further news of the same kind came from Pekin, Ill.; Creston, Ia., and St. Joseph, Mo. A number of branch roads seem to have been closed for two days or more. The Chicago correspondent of the New York *Evening Post* sums up the news, so far as it affects the railroads, as follows:

"The losses by the washouts have been the most disastrous in years; in fact, the leading roads along the Illinois River have never seen a time when they had so many bridges washed away in so short a time and were so generally forced to suspend traffic for the last three days of the week. Passenger trains were abandoned for at least two days by the Rock Island and the Santa Fe, and also on the branches of the Alton and the Burlington that run through the Illinois River Valley and the country tributary to it."

The railroads take a cheerful view of their troubles, as usual. As we are unable to harmonize the different

statements made, we print below the statements gathered at the railroad offices by our Chicago correspondent, and the reader can assimilate them with the foregoing to suit himself.

The Chicago & Alton was not damaged to any great extent. The accounts published in the papers stating that this line was running trains over other roads is untrue. The reverse is the case, as other roads used the Alton tracks. On the Illinois Central there has been no unusual delay of trains caused by floods. On the lines to Sioux City and to New Orleans the tracks have been flooded, but the trains passed through the water without accident or serious delay. The Chicago, Burlington & Quincy had considerable trouble on the first day of the flood, chiefly on the Iowa lines. No large damage has been done, but of course the danger of wrecks was considerably increased. There were no serious delays of trains after the first day. Three bad washouts occurred on the main line in Iowa. In one case 600 ft. of track was washed out.

The Chicago & Northwestern had no wrecks or other serious troubles, but the tracks were soft and in some places the clay road bed was displaced. The worst trouble was in Iowa where the water was high, and some trains were delayed, but the bridges are all in good condition.

The Rock Island had some damaged track, and trains were considerably late. The Rocky Mountain limited over this road was delayed considerably, and the party of mechanical engineers *en route* for California was delayed in Chicago from 7 o'clock in the evening until 11 o'clock the next day. Between Chicago and Joliet considerable track was washed out, and the damages will foot up to a considerable figure. The Chicago & Eastern Illinois had no washouts. The bridge accident at Cayuga, Ind., which was reported in the daily papers was not caused by flood.

The Atchison, Topeka & Santa Fe was the most seriously damaged of all the roads. On the 5th there was a disastrous wreck near Fort Madison, Ia., caused by the floods washing out a trestle resting on a double row of piles driven in the bed of the ravine. It is stated by some who were at the wreck that the trestle work was in very bad condition before the wash-out. This wreck is reported in another column. This line was badly damaged in Illinois and further west, and trains were generally delayed.

The Wisconsin Central was not damaged by the floods and the delays to trains were very small. The Chicago, Milwaukee & St. Paul suffered no considerable damage, but had some flooded track near Kansas City, and the through trains were delayed three or four hours.

On Saturday the roads were in good condition and trains were generally running on time. In some sections this flood is the worst that has been experienced for many years. All the roads passing through Joliet and in the vicinity of the Illinois River were much affected, and a large section of the Illinois Steel Co.'s plant was entirely flooded with water.

The Distress in India.

A parliamentary paper has just been issued containing a despatch from the Government of India to the Secretary of State for India upon the relief of agricultural distress in India in 1891-92. This despatch is dated Feb. 12. The three areas in which agricultural conditions are more or less unfavorable and in which State action for the relief of the poorer classes is necessary are (excluding Burmah, where gradual improvement is taking place): First, the region lying to the east of the Western States, and including the greater part of the so-called Deccan districts of Bombay and Madras, a considerable part of the states of Mysore and Hyderabad, and some of the districts in Madras to the south and east of these; second, Rajputana and some of the British districts on its borders in the Bombay Presidency; third, in Bihar. No material alteration in the prospects of any of these areas is expected until the beginning of the rainy season and the breaking of the southwest monsoon. The cause of the unsatisfactory harvest and of the distress was the scarcity of rainfall during 1891. The report indicates the immense value in this emergency of the extension of the railroad system made since 1877. In the famine districts the prices of grain have not risen to more than three-quarters the prices in the famine of 1876-77.

Not an Eight-Hour Agitator, Probably.

Harry S. Bolton, locomotive engineer on the Baltimore & Ohio, has made a run on the road of 400 consecutive days [of 12 hours each] from April 15, 1891, to April 15, 1892, making 35 days of overtime in the year. He has used seven different engines. Engineers changing from one engine to another usually lose from two to three days, for there are more engineers employed by the company than there are engines. Mr. Bolton has made as high as 56 days in one month, and 15¼ days time in one week. He runs the yard engine at Washington, Pa., at present. His territory extends 41 miles or over that portion of the track between Wyland and Elm Grove.—*Pittsburgh Paper.*

Estheticism in Railroading.

A committee of commuters and other patrons of the Central Railroad of New Jersey will present a petition to the officers of the company to have the color of the cars changed from the present sandy yellow color to a bottle green.—*New York Times.*

The women of Tariffville, Conn., have formed a club to raise funds to paint and paper the station of the Central New England & Western Railroad. They have been appealing in vain to the officials to have this done for some time and have now resolved to take the matter into their own hands.—*New York Sun.*

LOCOMOTIVE BUILDING.

The Mexican Central placed a contract last week with the Rhode Island Locomotive Works, of Providence, for three of the double-bogie compound locomotives patented by F. W. Johnstone, Superintendent of Motive Power of the road. These are to be duplicates of the engine illustrated in the *Railroad Gazette* of March 25 last.

CAR BUILDING.

The St. Paul & Duluth will receive, on May 20, two 14-section sleepers from the Barney & Smith Mfg. Co. There have been built at the Gladstone shops ten 38-ft. 60,000 lb. capacity freight cars, and six more are now under construction. Work will soon be begun replacing missing numbers.

The New York, Ontario & Western is receiving bids for 500 hopper bottom gondola coal cars of 25 tons capacity, and the contract will be awarded May 15. The company this week let a contract for six passenger cars to the Ohio Falls Car Co.

BRIDGE BUILDING.

Chattaroy, Wash.—Messrs. Mathews & Krech, of Minneapolis, have the contract for the bridges on the Great Northern extension from Chattaroy to the first crossing of the Columbia River.

Cumberland, Md.—The Georges Creek & Cumberland Railroad Co. is building a steel bridge over Will's Creek at the entrance to the narrows near Cumberland, Md. The masonry, two abutments and two piers, have been completed and the work of erecting the superstructure, three spans, double track, 94 ft. each, has been commenced.

Gilmer County, W. Va.—The county court has appointed H. M. Stump a commissioner to receive bids for the construction of a steel highway bridge over Stewart's Creek in that county. The same commissioner will also receive proposals for building forty-five foot approaches to the new steel bridge at Glenville. These will also be of steel and the low truss pattern.

Ohio County, W. Va.—The County Commissioners of Ohio County are building three new bridges over Wheeling Creek at various points along the national road within that county. Several other bridges will be built in the same county this summer.

Parkersburg, W. Va.—The new steel bridge over the Little Kanawha has been inspected and accepted by the County Commissioners and opened for traffic.

Summers County, W. Va.—The County Court has appointed commissioners to locate and arrange for building a new steel bridge over Lick Creek, at New Richmond, in that county. A three-span bridge is contemplated.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Burlington & Quincy, quarterly, 1½ per cent., payable June 15.

Cleveland & Pittsburgh, quarterly, 1¾ per cent. upon the guaranteed stock payable June 1.

Mexican Northern, quarterly, 1½ per cent., payable May 16.

North Pennsylvania, quarterly, 2 per cent., payable May 25.

Seaboard & Roanoke, semi-annual, 3½ per cent., payable on demand.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 24.

Canada Southern, annual, New York City, N. Y., June 1.

Chicago, Burlington & Quincy, annual, Chicago, Ill., May 18.

Chicago & Eastern Illinois, annual, Chicago, Ill., June 1.

Chicago & Northwestern, annual, Chicago, Ill., June 2.

Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 4.

Delaware & New England, annual, Wilmington, Del., May 16.

Des Moines & Fort Dodge, annual, Des Moines, Ia., June 2.

Detroit & St. Clair River, annual, St. Clair, Mich., May 18.

International & Great Northern, special, Palestine, Tex., July 14.

Kansas City & Omaha, special, Fairfield, Clay Co., Neb., May 25.

Manchester & Lawrence, annual, Manchester, N. H., May 27.

Minneapolis, St. Paul & Sault Ste. Marie, annual, Minneapolis, Minn., June 7.

Missouri, Kansas & Texas, annual, Parsons, Kan., May 18.

New York & Harlem, annual, New York City, N. Y., May 17.

New York & New England, annual adjourned, Boston, Mass., May 31.

New York, New Haven & Hartford, special, New Haven, Conn., May 26.

Omaha & St. Louis, annual, Stanberry, Mo., May 17.

Paducah, Tennessee & Alabama, special, Puducah, Ky., June 15.

Pittsburgh, Fort Wayne & Chicago, annual, Pittsburgh, Pa., May 18.

St. Joseph & Grand Island, annual, Elwood, Kan., June 14.

St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 6.

St. Louis, Iron Mountain & Southern, special, St. Louis, Mo., May 27.

St. Paul & Sioux City, annual, St. Paul, Minn., June 4.

Spuyten Duyvil & Port Morris, annual, New York City, N. Y., May 17.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Association of Railway Accounting Officers* will hold its fourth annual meeting at the Auditorium Hotel, Chicago, Ill., May 25.

The *American Institute of Electrical Engineers* will hold its next annual meeting at the Grand Pacific Hotel, Chicago, Ill., June 6.

The *American Society of Civil Engineers* will hold its next annual convention at the Hygeia Hotel, Old Point Comfort, Va., June 8.

The *Master Car Builders' Association* will hold its annual convention at Congress Hall, Saratoga Springs, N. Y., June 15.

The *American Railway Master Mechanics' Association* will hold its annual convention at Congress Hall, Saratoga Springs, June 20.

The *American Association of General Baggage Agents* will hold its next annual meeting at Mackinac Island, Mich., July 20.

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston Mass., on the second Monday of each alternate month commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November. By special resolution the next meeting will be held in April.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Engineers and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

Engineers' Club of Cincinnati.

At the April meeting of the club there was an attendance of 45 members and several visitors. Mr. Bouscaren read a very interesting paper on the subject of the work being done to restore the anchorage of the cables of the suspension bridge between Cincinnati and Covington. The bridge was erected in 1866, and a recent examination of the anchorages revealed the necessity of strengthening the cables at these points, and Mr. Bouscaren has had charge of the work.

New York Railroad Club.

The regular monthly meeting for May will be held on the evening of Thursday, the 19th, at 7:30, at the rooms of the American Society of Mechanical Engineers, 12 West 31st street. The paper of the evening will be by Mr. D. L. Barnes, on "Draft Rigging for Freight Cars," and will be illustrated by stereopticon.

PERSONAL.

—Mr. Fred. Atkins, a Civil Engineer at Astoria, Wash., of the Astoria & Portland road, was drowned in Young's River April 29.

—Mr. Charles Hall has been appointed Secretary of the Indianapolis freight bureau, succeeding Mr. J. D. Riddell, resigned.

—The Mississippi Railroad Commission has re-elected Major J. F. Sessions, President, and has elected Sidney L.

McLaurin, of Rankin, Secretary, vice Findley S. Scruggs, resigned.

—J. H. Parsons, Division Superintendent of the Atchison, Topeka & Santa Fe, with headquarters at Wichita, Kan., has resigned, and will remove to Chicago to engage in other business in that city.

—Mr. S. M. Rodgers, who has been in the service of the Pittsburgh & Western, in the Master Mechanic's office, has been appointed chemist for the Hainesworth Steel Co., Twenty-seventh and Smallman streets, Pittsburgh.

—Mr. J. R. Parrott, who was Receiver of the Florida Southern, which was recently reorganized, and also General Counsel and Land Commissioner of the Jacksonville, Tampa & Key West road, has resigned those positions, to take effect June 1.

—Mr. R. B. Williams, who has been Trainmaster of the New York, Ontario & Western at Weehawken, has been appointed Assistant Superintendent of the Scranton Division. Mr. Williams was formerly Division Superintendent of the New York & New England.

—Mr. L. S. Thorne has been appointed General Superintendent of the Texas & Pacific by President Gould. Mr. Thorne has been connected with the road for several years as Trainmaster and Assistant Superintendent and recently as Superintendent of Transportation.

—Mr. Epes Randolph has been appointed Chief Engineer of the Western Division of the Newport News & Mississippi Valley Railroad, to succeed Mr. C. T. Sabin, who has been appointed Engineer of Bridges and Buildings. Mr. Randolph has been Superintendent and Chief Engineer of the Elizabeth, Lexington & Big Sandy road.

—Mr. Charles A. Walker has been elected Treasurer of the Delaware & Hudson Canal Co., succeeding Mr. James C. Hartt, who retired some time ago, after the service of a lifetime. Mr. Walker has been 26 years in the service of the company in different capacities, and for about seven years he has held the office of Assistant Treasurer.

—Mr. W. W. Finley, Chairman of the Western Passenger Association and member of the Board of Commissioners of the Western Traffic Association, has resigned. He gives no reason for his resignation, but it is rumored that he is to take a position with a Southern road. A meeting will be called the first of next week to choose his successor.

—Prof. Henry C. Adams, of the University of Michigan, Statistician of the Interstate Commerce Commission, will give a course of lectures on Finance at the Johns Hopkins University next year. The newspaper statement that he has been called to the chair of Finance in that university is incorrect. He retains his connection with the University of Michigan.

—Mr. V. E. McBee, General Superintendent of the Central of Georgia, has resigned, and it is reported that he will take a position with one of the roads of the Vanderbilt system. Mr. McBee has been General Superintendent of the Central of Georgia since its lease to the Georgia Pacific. He was formerly Superintendent of the Western North Carolina and of other divisions of the Richmond & Danville.

—Mr. William A. Baldwin has resigned the office of Vice-President of the Buffalo, Rochester & Pittsburgh Railroad, which he has held since March, 1888. Mr. Baldwin was formerly connected with the Pennsylvania Co.'s lines in various capacities for 30 years, and was General Manager of the lines between 1882 and 1888, resigning in the latter year to go to the Buffalo, Rochester & Pittsburgh.

—Mr. Newman Kline has been appointed Superintendent of the Seattle, Lake Shore & Eastern division of the Northern Pacific. Mr. Kline began railroading in 1877 as a telegraph operator on the Lake Shore & Michigan Southern; he afterward occupied the position of Chief Clerk in various departments with that road, the Denver & South Park, the Oregon Railway and Navigation Co. and the Northern Pacific. In June, 1888, he was appointed Assistant Superintendent of Transportation of the latter road, and in June, 1890, was promoted to the position of Assistant to the General Manager, and will continue to act in that capacity until June 1.

—Mr. J. K. Watts, who has been Superintendent of the Toledo Division of the Lake Shore & Michigan Southern for some years has resigned and will retire from railroad service. He had been in the service of the company for 20 years, beginning as a messenger boy. Mr. J. K. Russell has been transferred to the Toledo Division and Mr. A. B. Newell, who is a son of President Newell, has been appointed his successor on the Franklin Division, being transferred from the Kalamazoo Division. He was appointed to that office a few months ago and was formerly Assistant Train Dispatcher of the division of which he now becomes Superintendent. Mr. D. J. Sutfin, who has been agent at Buffalo has been appointed Superintendent of the Western Division, and other changes in the department are noted in another column.

—The resignation of Captain John A. Grant as Third Vice-President and General Manager of the Texas & Pacific was announced this week. Captain Grant has been General Manager of the road since 1886, and Vice-President for the last few years, and his resignation is entirely unexpected. He first entered railroad service in 1859 and served on a number of Southern roads in the various positions of an engineer's party. Among other positions he was Chief Engineer of the Northeastern of Georgia, Principal Assistant Engineer of the Port Royal & Augusta and of the Georgia Western, of which he was also Chief Engineer. He became General Superintendent of the Macon & Brunswick in 1874, and in 1877 Chief Engineer and General Superintendent of the Memphis & Charleston, where he remained until 1881. He was Chief Engineer of the Louisville, New Orleans & Texas for some years and also of a road in Guatemala.

—Mr. O. F. Nichols, Chief Engineer of the Brooklyn Elevated road, has been chosen General Manager also, succeeding Col. Frederick Martin, resigned. Mr. Nichols is a graduate of the Rensselaer Polytechnic Institute and has had an extensive experience in railroad and general engineering practice. In the early seventies he went to Peru and became Division Engineer of the Callao, Lima & Oroya road, and Resident Engineer of the Chimbote & Huaraz roads, having charge of tunnel sections on both lines. He was Assistant Engineer of the Edge Moor Bridge Works during the erection of the Metropolitan Elevated in New York. In 1878 Mr. Nichols became Resident Engineer of the Madeira & Mamore road in Brazil; between 1879 and 1882, he was Assistant Engineer of the New Jersey Steel & Iron Co.; Resident Engineer of the Henderson Bridge from 1882 to 1885, during its erection, and Principal Assistant Engineer of the Suburban Rapid Transit Co. for about two years, resigning in the fall of 1888 to become Chief Engineer of the Brooklyn and Union Elevated roads. Mr. Nichols is a director of the American Society of Civil Engineers, member Institution Civil Engineers, and President Rensselaer Society of Engineers.

—A telegram from Budapest announces the death there last Monday of Gabriel Baross, the Hungarian Minister of Commerce, who will long be remembered as the designer and introducer of the Hungarian "zone tariff," a measure without doubt of immense value to his country, politically as well as economically, and one which tended to make him one of the most popular men in the kingdom. A publication recently issued from his office in both French and German gives the considerations, which determined the formation of that tariff, and shows that they were of the most practical and special character. Every provision was calculated to meet some want which had been experienced in the history of Hungarian passenger traffic, without the slightest idea of establishing a system generally applicable in other countries. Baross was not counted a man of remarkable talent, but he was a man of remarkable will, and as such succeeded in carrying through measures which abler men, or rather men of more talent—for it is always the strong will which accomplishes things—would have hardly ventured to propose.

—William Powell Shinn, who died at his home in Pittsburgh on May 5, 1892, was a conspicuous example of the successful practical man in American life. With only a common school education, he became distinguished as a manager of public works, and, finally, was honored by election to the Presidency of the American Society of Civil Engineers, where he contributed largely by his studies and efforts to the new constitution of that society. He had 10 years before been President of the American Society of Mechanical Engineers. Mr. Shinn wrote many valuable papers relating to railroad transportation and management, most of which have been printed, or at least commented on in this journal. As Vice-President of the American Steam Heating Co., and subsequently as President of the New York & New England Railroad, he became familiarly known in New York as having rendered valuable services to both these enterprises. One of his latest successes in management was in conducting the members of the British Iron and Steel Institute, with the delegates from Germany, through the United States in the summer of 1890, a performance requiring great tact, judgment and firmness, by which he won the admiration of all who witnessed it. Mr. Shinn received from abroad many testimonials of esteem and friendship after the return of these gentlemen to their homes.

Mr. Shinn was born at Burlington, N. J., on May 4, 1834, and was educated in the public schools. He showed a predeliction for the engineering profession, and in 1850 and 1851 he was a rodman in the engineer corps of the Ohio & Pennsylvania Railroad. From 1851 to 1852 he was assistant engineer on the same road. In 1852 and 1853 he had charge of the fuel and water supply of the road. He was the principal assistant engineer on the Fort Wayne & Chicago. In 1855 he was auditor of the freight accounts of the Ohio & Pennsylvania, and in 1856 he was the engineer in charge of the land maps and titles of the Ohio & Indiana Railroad. He had charge of the freight accounts of the Pittsburgh, Fort Wayne & Chicago from 1856 to 1861, and he also had charge of the passenger accounts of the road in 1856 and 1857. He was general bookkeeper of the road from 1857 to 1861, general passenger agent from 1861 to 1863, Superintendent of the Eastern Division from 1863 to 1865, and general freight agent from 1865 to 1872. He was general agent of the Pennsylvania Company in 1872 and 1873, and from 1871 to 1873 he was treasurer of the Granite Improvement Company and in charge of the construction of the Ashtabula, Youngstown & Pittsburgh Railroad. He was Assistant President and Controller of the Allegheny Valley Railroad in 1874; Secretary in 1874 and 1875, and Vice-President and Controller from 1875 to 1877. In 1874 and 1875 he was also President of the Ashtabula, Youngstown & Pittsburgh. He was Arbitrator of the Lake Erie Iron Ore Pool in 1886. From 1886 to 1890 he was Vice President and General Manager of the New York & New England Railroad. He was again Vice-President of the Allegheny Valley Railroad from 1888 to 1890, and for a time was General Manager of the Edgar Thomson Steel Co. Mr. Shinn was President of the American Institute of Mining Engineers in 1880, and of the American Society of Civil Engineers in 1890.

ELECTIONS AND APPOINTMENTS.

Adirondack & St. Lawrence.—C. F. D. Gardinier, for many years Roadmaster on the New York Central, between Schenectady and Little Falls, N. Y., but who resigned last fall, has been appointed Roadmaster of this road.

Alabama Great Southern.—M. A. Zook, formerly with the Lake Shore & Michigan Southern as Assistant Engineer, has been appointed Roadmaster, with jurisdiction from Chattanooga to Birmingham, with headquarters at Birmingham, Ala. The jurisdiction of P. Nolan, Roadmaster, will extend from Birmingham to Meridian, Miss.

Astoria & Portland.—The following are the officers of this company formerly the Astoria & South Coast: John C. Sheehan, President, 31 Broadway, New York; C. W. Scofield, Vice-President, Salt Lake City; J. Frank Watson, Secretary and Treasurer, Portland, Ore., and George Goss, Chief Engineer and Manager, Astoria, Ore.

Baltimore & Ohio.—W. T. Manning, previously Assistant Engineer, has been appointed Assistant Chief Engineer, with office at Pittsburgh, Pa.

Brainerd & Northern Minnesota.—The incorporators of the company in Minnesota are: John T. Pillsbury, George H. Pillsbury, Arthur E. Bardwell, William B. Ransom, James E. Glass, Ray W. Jones and James A. Kellogg, all of Minneapolis. The officers are: President, John T. Pillsbury; Vice-President, George A. Pillsbury; Secretary, James E. Glass; Treasurer, W. B. Ransom, and General Manager, Ray W. Jones. David Foneri, of Brainerd, Minn., is Chief Engineer.

Brigantine Beach.—The company elected the following officers last week: President, J. W. Coffin; Vice-Presidents, Phineas Garrett and Joseph Thomson; Secretary and Treasurer, E. Clarence Miller; Directors, J. W. Coffin, Samuel E. Perry, Phineas Garrett, A. B. Smith, J. W. Miller, C. W. Parker, Joseph Thompson, Clarence E. Cole; E. Clarence Miller, E. S. Jaffern, E. C. Stout, A. S. Pattison, and J. B. Van Wert.

Brooklyn Elevated.—The contest for the control of this road, which has been carried on for some months, and has resulted in considerable litigation, was ended last week by the election, at the postponed annual meeting, of the following directors, who were on the "Uhlmann ticket." The new directors are: Lewis Adler, Anthony Barrett, A. J. Hardenbergh, Adolph Ladenburg, Leonard Levisohn, Edward J. Richards, Simon Rothschild, Jacob Scholle, William H. Sidney, William Strauss, Simon Uhlmann, Frederick Uhlmann, and General George W. Wingate. Vacancies caused by the retirement of Louis Adler and W. H. Sidney as directors were filled by the choice of Ernest Thalmann and Edward Lauterbach. Adolph Ladenburg was made President to succeed Henry W. Putnam. Anthony Barrett was elected Vice-President to succeed Elbert Snedeker. Frederick Uhlmann was made Secretary and Treasurer in the place of Hugo Rothschild. Colonel Frederick Martin's resignation as General Manager was accepted, and O. F. Nichols, the Chief Engineer of the company, was made General Manager also.

Brunswick, Western & Florida.—At a meeting of the directors of the road, held in Wilmington, N. C., John C. Wiswell, of New York, was elected President of the company, vice George L. Dunlap, of Chicago, resigned.

Buffalo, Rochester & Pittsburgh.—George E. Merchant has been appointed Assistant to the President of the railroad company. He will also retain his position as President of the Rochester & Pittsburgh Coal and Iron Co. The office of vice-president of the railroad company is likely to remain vacant.

Burlington, Cedar Rapids & Northern.—The following officers were elected at the annual meeting at Cedar Rapids, Ia., May 5: C. J. Ives, President and General Manager; J. C. Brocksmit, Vice-President; W. P. Brady, Secretary; S. S. Dorwart, Treasurer; H. F. White, Chief Engineer.

Canadian Pacific.—George S. Cantlie has been appointed Acting General Baggage Agent of all lines of this company, with headquarters at Montreal, in place of E. S. Anderson, resigned.

Central Dock & Terminal Co.—At the annual election for directors of the company held at Buffalo Chauncey M. Depew, George J. Magee, A. A. McLeod, Theodore Voorhees, J. M. Toucey, John Lang, D. Beach, H. J. Hayden, A. Foster, C. E. Henderson, T. M. Richards, John Magee and A. R. Atkins were elected.

Chicago, Kalamazoo & Saginaw.—W. S. Dewing has been elected Vice-President and General Manager of this company, with office at Kalamazoo, Mich., in place of Frederick Bush, deceased.

Chicago, Milwaukee & St. Paul.—John T. Conley has been appointed Assistant General Passenger Agent, with office at No. 176 East Third street, St. Paul, Minn., to succeed the late W. H. Dixon; appointment effective June 1.

John T. Conley has been appointed Assistant General Passenger Agent of the company at St. Paul, to succeed the late W. H. Dixon. The appointment is to take effect June 1.

Chicago, Rock Island & Pacific.—T. B. Cook, Train Master, has been promoted to the position of Assistant Superintendent of the Southwestern Division of the lines east of the Missouri River, with headquarters at Trenton, Mo.

Columbus, Lima & Milwaukee.—The annual meeting was held at Lima, O., May 3. B. C. Faurot, formerly President, and the directors friendly to him failed of re-election. The new directors are as follows: John H. Padgham, Allegan, Mich.; John R. Markle, Detroit; H. Sabine, Marysville, O.; L. K. Stroup, New Hampshire; W. A. Walley, Muncie, Ind.; A. C. Baxter, Jr., F. P. Grof and F. L. Langan, Lima. The directors elected H. Sabine, President; John H. Padgham, Vice-President; F. P. Grof, Secretary, and F. L. Langan, Treasurer.

Delaware & Hudson Canal Co.—At the annual meeting of the stockholders in New York, May 11, Vanderbilt representation was secured by the election to the board of managers of Cornelius Vanderbilt, Chauncey M. Depew and Samuel Spencer, in place of W. W. Astor, John A. Stewart and Johnston Livingston, who declined re-election. The board now is composed as follows: Le Grand B. Cannon, James Roosevelt, Robert M. Olyphant, Benjamin H. Bristow, R. Suydam Grant, William H. Tillinghast, Alfred Van Santvoord, James A. Roosevelt, Alexander E. Orr, Oliver P. C. Billings, Samuel Spencer, Cornelius Vanderbilt and Chauncey M. Depew. The number of votes cast was the largest in the history of the company, amounting to 230,689 shares. Only one ticket was voted, the management casting over 175,059 votes. Dr. W. Seward Webb voted 37,300 shares.

The Board of Managers has organized by re-electing the old officers: President, Robert M Olyphant; Vice-President, Le Grand B. Cannon; Treasurer, Charles A. Walker; Secretary, F. M. Olyphant. H. G. Young will be reappointed Second Vice-President and General Manager, with headquarters at Albany, N. Y.

Denver Union Depot Co.—The following officers were elected last week: W. A. Deuel, President; E. T. Jeffery, Vice-President; G. E. Ross-Lewin, Treasurer, and W. B. Trufant, Secretary and Superintendent.

Elizabeth, Lexington & Big Sandy.—George W. Lewis has been appointed Superintendent of the road, which recently became part of the Chesapeake & Ohio system.

Gladeville.—The following officers were elected April 26: President, E. M. Fulton; Secretary, T. M. Alderson; Treasurer, C. F. Flanary, and the following directors: C. F. Flanary, J. E. Lipps, T. M. Alderson, C. M. Vicars, T. G. Wells, J. C. Richmond, N. B. Dotson, W. T. Miller and E. M. Fulton, all of whom reside at Wise Court House, Va., which is the name of the post office, Gladeville being the name of the town.

Great Northern.—A circular issued on May 1, announces the following changes and appointments: The Great Northern will be divided into two general divisions. The Eastern Division to embrace all lines east of Minot, including the Willmar & Sioux Falls and Duluth, Watertown & Pacific roads. The Western Division to embrace all lines and branches Minot to Great Falls Mont., and west to Pacific Junction. Charles W. Case, General Superintendent, remaining in charge of Eastern Division, with headquarters at St. Paul, Minn. C. Shields has been appointed General Superintendent, Western Division, with headquarters at Kalispell, Mont., after June 1 at Spokane, Wash. The above officers will have general charge of the maintenance of

roadway and structures and of station and transportation service.

E. B. Wakeman has been appointed General Superintendent of Transportation.

J. H. Grau has been appointed General Agent at Philadelphia, Pa.

The following appointments have also been made: F. E. Draper as Assistant Auditor freight receipts, and W. J. Evans as freight claim agent.

Houston Belt.—The following officers were elected at Houston, Tex., last week: Dr. R. H. Harrison, of Columbus, Tex., President; E. J. Sandemeyer, of Columbus, Vice-President; B. P. Morris, Secretary and Treasurer, and T. P. Nichols, of Galveston, General Manager.

Illinois & Iowa Railway & Terminal Co.—The officers are: Morris Rosenfield, President, Moline, Ill.; Judge E. H. Thayer, Vice-President, Clinton, Ia.; E. H. Whitcomb, Secretary, Davenport, Ia.; M. L. Marks, Treasurer, Davenport, and Geo. T. Baker, Chief Engineer, Davenport.

Iowa & Minnesota.—The first board of directors are as follows: Charles H. Petsch, William Hamm, Reuben R. Galusha, all of St. Paul; Ernest M. Dickey, of Chicago, and Chares E. Harrington, of New York. J. H. Swan, of Sioux City, is attorney for the company.

Kanawha & Michigan.—R. W. Kelly, formerly Assistant to the President, has been elected Secretary and Treasurer of this company, vice R. H. T. Halsey.

Kansas City Suburban Belt.—W. S. Taylor, Assistant Secretary, has been elected Treasurer of this company, vice M. C. Curtis, resigned. His office will be at Seventh and Wyandotte streets, Kansas City.

Lake Shore & Michigan Southern.—The following changes have been made in the transportation department: J. K. Russell has been appointed Superintendent of the Toledo Division, with office at Cleveland, O., vice J. M. Watts, resigned. A. B. Newell has been appointed Superintendent of the Franklin Division, with office at Youngstown, O., vice J. K. Russell, transferred. A. G. Amsden has been appointed Superintendent of the Kalamazoo Division, with office at Grand Rapids, Mich., vice A. B. Newell, transferred. D. G. Sutfin has been appointed Superintendent of the Western Division, with office at Chicago, vice A. G. Amsden, transferred. John F. Lane, who has for some time been Mr. Sutfin's chief clerk, has been appointed to succeed him as local Freight Agent at Buffalo.

Mexican Central.—The annual meeting was held in Boston, May 4, and the old directors were re-elected as follows: Oliver Ames, I. T. Burr, Sebastian Camacho, E. W. Converse, J. Edwards, E. W. Jackson, L. Z. Leiter, E. R. Morse, S. W. Reynolds, J. Richardson, W. Rotch, Warren Sawyer, Alden Speare, R. R. Symon, J. H. White, E. H. Whorf and G. B. Wilbur. The board is the same as that of last year, save that two of the Mexican directors retire and their places are not filled. The officers elected were: S. W. Reynolds, President; Robert R. Symon, Vice-President; E. W. Jackson, Second Vice-President and General Manager, and J. T. Harmer, Clerk and Treasurer.

Middlesex Valley.—The Directors are: Charles W. Drake, Lathrop R. Bacon, Louis O. Van Doren and Frederick H. Patterson, all of New York City; John H. Drake and William D. Stratton, of Middletown, N. Y.; Anson G. P. Segur, of Brooklyn; Clarence H. Wildes, of Riverdale, and Archibald Gracie, of New Brighton, N. Y. The principal office of the company will be in New York.

New York, Lake Erie & Western.—H. B. Crandall has been appointed Coal Freight Agent of the lines east of Buffalo and Salamanca. He has been Chief Clerk in the Coal Department for several years.

Willard Kells, oldest son of the late Ross Kells, Superintendent of Motive Power of the Erie, has been made Foreman of the Erecting Department of the company's shops at Meadville, Pa.

New York, Ontario & Western.—A. C. Caryl, Assistant Superintendent of the Scranton Division, having resigned, R. B. Williams has been appointed Assistant Superintendent of the division.

Northern Pacific.—Newman Kline has been appointed Superintendent of the Seattle, Lake Shore & Eastern Division, with headquarters at Seattle, Wash. This appointment will take effect about June 1. Fred Kirch has been appointed Roadmaster, with headquarters at Detroit, Minn., vice George H. Scovyale, resigned.

W. H. Brimson, Assistant Superintendent of the Pacific and West Cascade Division for the past two years, has been appointed Superintendent of the Rocky Mountain Division, with jurisdiction from Hope to Helena, Mont., and with headquarters at Missoula, Mont. He succeeds S. G. Ramsey.

Pecos Valley.—H. P. Lillibridge has been elected Vice President and Treasurer of this company, with office at Colorado Springs, Col.

Pittsburgh, Virginia & Charleston.—The annual election of the directors at Philadelphia last week resulted in the election of these officers: President, J. N. Du Barry; Directors: George B. Roberts, N. Parker Shortridge, W. H. Barnes, John P. Green, W. L. Elkins, A. M. Byers, Charles E. Speer, W. J. Howard, George V. Lawrence, Charles L. Taylor, Henry D. Welsh, Joseph Walton.

Port Reading.—Charles A. Thompson has been appointed Superintendent of Motive Power and Rolling Equipment, with office at Jersey City, N. J. John G. Thomas has been appointed Assistant Superintendent of Motive Power and Rolling Equipment, with office at Jersey City, N. J., both appointments effective April 26.

Quincy, Omaha & Kansas City.—H. L. Kleine has been appointed General Baggage Agent, with office at Quincy, Ill., vice W. C. Modisett. John Soderstrom has been appointed Roadmaster, with headquarters at Milan, Mo., vice H. A. Cook.

Ripley & Mill Creek Valley.—The officers of this road are as follows: John H. Riley, President, Marietta, O.; Warren Miller, Vice-President, Jackson C. H., W. Va.; John S. McKown, Secretary, Jackson C. H., W. Va.; George W. Thompson, Treasurer and General Manager, Parkersburg, W. Va.; W. E. Walker, Superintendent, Jackson C. H., W. Va. The principal office is at Jackson C. H., W. Va.

Rome, Watertown & Ogdensburg.—The headquarters of Edgar Van Etten as Superintendent of the road, will be temporarily at Watertown, N. Y., instead of at Syracuse, N. Y. The permanent headquarters have not been fixed.

St. Louis, Chicago & St. Paul.—The incorporators and first board of directors are: Henry O'Hara, of St. Louis; Anthony Isch, Clark L. Whitney, Royal J. Whitney and James Elmer Whitney, all of East St. Louis.

St. Louis Southwestern.—The stockholders of the company met in St. Louis May 5 and elected the following Board of Directors: S. W. Fordyce, W. B. Doddridge, R. M. Galloway, Robert Moore, Edwin Gould, M. Gernsheim, Thomas T. Eckert, A. L. Wolffe and W. S. Pierce. Two hundred and eighty-five thousand shares of a total of 365,000 were represented. The directors re elected officers as follows: S. W. Fordyce, President; Edwin Gould, Vice-President; W. B. Doddrige, General Manager; J. C. Otteson, Secretary.

Salt Lake, Hailey & Puget Sound.—A meeting of the stockholders was held May 2 at Salt Lake City, and the following directors were elected: William Burke, B. R. Towndrow, E. E. Rich, A. Habauer, and J. R. Middlemiss.

Southern Pacific Co.—R. P. Schwerin, whose title has heretofore been given as Purchasing Agent, has been appointed Manager of Purchases and Supplies for the Pacific System of this company, with headquarters at San Francisco, Cal. R. Stevenson has been appointed Assistant Manager of Purchases and Supplies for the Pacific System, with headquarters at San Francisco.

Tennessee Midland.—The following directors, representing the Paducah, Tennessee & Alabama, were elected last week at a special meeting of the stockholders: John T. Davis, William L. Huse, Alvah Mansur, T. H. West, T. J. Moss and James H. Allen, of St. Louis; A. S. Buford and R. L. Traylor, of Richmond, Va.; John Overton, Jr., D. T. Porter and T. J. Latham, of Memphis. The new directors elected T. J. Moss, of St. Louis, President; T. H. West, of St. Louis, Vice-President and Chairman of the Board; John Overton, Jr., of Memphis, Second Vice-President, and Frank P. Jones, of St. Louis, Secretary.

Union Pacific.—M. Patterson, who has been General Foreman of the shops at Omaha for a number of years, has been appointed Master Mechanic, with headquarters at Salt Lake City. He succeeds A. C. Hinckley, who has been transferred to St. Joseph, Mo., as Master Mechanic of the St Joseph & Grand Island.

Winona & Southwestern.—The following officers of the Winona & Southwestern Improvement Co. were elected May 2: President, V. Simpson; Vice-President, H. W. Lamberton; Treasurer, M. G. Norton; Secretary, E. G. Hornbrooke.

RAILROAD CONSTRUCTION,

Incorporations, Surveys, Etc.

Adirondack & St. Lawrence.—It has been decided to open the road from Poland, N. Y., north to Old Forge July 25, and from Malone south to Saranac Lake on the same date. This will leave a gap of about 60 miles of road uncompleted, with about 25 miles in working order on either end. The track is now laid from Poland and Remsen north to the Moose River, and is now being laid along the north side of the river.

Asheville & Bristol.—A mass meeting of the citizens of Buncombe County was held at Asheville, N. C., May 7, to consider the question of building a road from Asheville to Bristol, Tenn., or some point on the Norfolk & Western. A committee was appointed to attend a conference at Elizabethton June 8. At that meeting it is expected arrangements will be perfected for the construction of the line.

Atlantic Coast Line.—Col. F. Gardner, Engineer of Construction, began a preliminary survey last week for a proposed extension of the Manchester & Augusta road to Orangeburg, S. C. The survey will occupy the greater part of the month and, though it is expected that orders will soon be given to put the line under contract, nothing definite will be decided until the engineers complete their estimates. The survey begins on Santee River, near Rimini, the terminus of the Manchester & Augusta road, and will run southwest a distance of about 25 miles to Orangeburg.

Austin & Northwestern.—The track on the Llano extension reached the end of the seventeenth mile from Fairland, Tex., on the main line on May 1. The track is being laid at the rate of about a mile a day. There are 12 miles to be laid to reach the town of Llano, the western terminus of the line now being built.

Baltimore Belt.—Rapid progress on the tunnel is being made by the contractors, Ryan & McDonald. The report for April shows that 4,825 ft. have been completed, leaving 3,725 ft. still to be done. An opening has been made between the shafts at German, Saratoga and Franklin streets, making a continuous tunnel from a point midway between Franklin and Centre streets to the north side of Lombard street. At the Preston street shaft 998 ft. have been completed, and at Madison street 967 ft. From the north heading of Franklin street to the south heading of Madison street there are 499 ft. unfinished, and from the north heading at Madison street to the south heading at Preston street 649 ft. are still to be completed. From the south heading of the German street shaft to Camden street is all of the south end of the tunnel that is yet to be done. Owing to the change made in the route above Mount Royal avenue, to avoid a piece of property that could not be secured, there will be a double tunnel from Mount Royal avenue to a point above Lanvale street. At this place each tunnel will be about 450 ft. long; each will have two tracks.

Baltimore & Cumberland.—The stockholders of the company held a meeting at 213 East German street, Baltimore, May 5, and subscribed for the remainder of the additional issue of $1,000,000. The various routes proposed between the termini of the road were considered, and President H. G. Davis called attention to what is known as the "interior route," which was surveyed last year. He stated that the engineers are making good progress in the examination of the river route from Cumberland to Hagerstown, Md.

Beech Creek.—Several thousand acres of bituminous coal lands in the western part of Clearfield County, near Du Bois, are reported to have been recently purchased in the interest of this company by J. H. Pentz, of Du Bois, and others. It is said to be the intention of the purchasers to build an extension in these coal fields about 20 miles northwest of the town of Clearfield.

It is reported that the Philadelphia & Reading is also interested in these coal lands, and that a contract has been entered into between the Buffalo, Rochester & Pittsburgh, the Beech Creek and the Reading for the shipment of bituminous coal to Eastern points.

Brainerd & Northern Minnesota.—The company was incorporated in Minnesota last week to build a road 15 miles north from Brainerd. A narrow gauge line, about 25 miles long, will be merged with the new line, and changed to standard gauge. A further exteasion will then be built and the total mileage will be about 75 miles.

Brooklyn Elevated.—Plans have been completed for removing the elevated structure on Park avenue between Hudson and Grand avenues, and on Grand avenue between Park and Myrtle avenues, Brooklyn, and for constructing the extension from Van Sicklen avenue, east. Plans for the extension of the elevated structure to form new connections with the Brooklyn bridge are also being prepared.

Brunswick, Western & Southern.—H. H. Dougherty, of Wilmington, the General Manager of the road, announces that he has arranged to begin grading on the line via Southport, N. C., in a few days, and expects to complete the construction work north of Wilmington, a distance of 20 miles, at once. Capt. Walker G. McRae is the Chief Engineer.

Caldwell.—One mile additional of the Caldwell extension is now being laid to Essex Fells, N. J., and it is hoped to finish it by June. Essex Fells is one mile beyond Caldwell, on the proposed extension to Lake Hopatcong.

Canadian Pacific.—The annual report of the company, submitted at the annual meeting last week at Montreal, shows gross earnings for the year ending Dec. 31, $20,241,095; operating expenses, $12,231,436; leaving net earnings, $8,009,659. Fixed charges were $4,664,493, leaving a surplus of $3,345,166. Dividends amounting to $1,300,000 have been paid, leaving a surplus of $2,045,166, surplus of previous years, $2,656,432, making a total surplus of $4,701,599.

Central of New Jersey.—The work on the Navesink road, which is being built from Atlantic Highlands to the Highlands of Navesink, near Long Branch, N. J., is now practically completed. About five miles of track has so far been laid, and at present some 450 men are at work. The contractors for the grading are Burke Bros., of Scranton, and Cofrode & Saylor, of Philadelphia, have the bridge work. This is the principal work remaining to be completed. It concludes the construction of a large wharf in the bay at Atlantic Highlands with pile trestle approaches and a bridge across the Shrewsbury River about 270 ft. long, and also a pile trestle at the same point about 1,330 ft. long.

Chicago, Burlington & Quincy.—The contractors have about 300 teams now at work on the road which is being built to connect with the new bridge across the Mississippi at Alton, Ill. The new branch will be 32 miles long, and will begin at Old Monroe, on the St. Louis, Keokuk & Northwestern, and extend in an easterly direction to Alton, crossing the peninsula between the Mississippi and the Missouri River. R. M. Quigley & Co., of 732 Pine street, St. Louis, are building the road, and have sublet all the work to the following contractors: M. S. Cartter & Co. for the piling and trestling, and the grading to T. Ford & Co., Keokuk, Ia.; G. E. Jekyll, Memphis, Tenn.; W. A. Mantel, M. C. Clarahan and Sullivan Bros., St. Louis, Mo. The Alton bridge was designed by George S. Morison, of Chicago.

Duluth & Iron Range.—The contractors are building a wagon road along the line of the extension to Merritt in the Mesaba range. R. B. Dear, who has the tracklaying and bridge building contract, says that the new line will be ready for operation by Aug. 1, though Winston Bros.' contract does not call for completion until Aug. 15. The bridge work will require 500,000 ft. of timber. Mr. Dear will also do the clearing.

Duluth Transfer & Railway Co.—The contract for constructing 15 miles of double track, between Duluth and West Duluth, has been let to Grant & Foley, of St. Paul. Work is to be begun at once and to be completed before July 15.

Flint & Pere Marquette.—If 100,000,000 ft. of lumber can be shown in the eastern part of Missaukee County, Mich., the Harrison branch of the road will be extended through the County.

Florence, Cripple Creek & State Line.—The chief engineer began the locating survey at Florence, Col., last week, for the line north of that town to Cripple Creek and Fremont. A preliminary survey has only recently been completed over the entire distance to Fremont, which is 40 miles north of Florence. The present survey will be finished early in June.

Gladeville.—Engineers were engaged last week to survey the route from Wise Court House north to Gladeville, on the Louisville & Nashville, near Big Stone Gap. The company hopes to have the survey for this section of the line completed this month, and to begin work early in June. E. M. Fulton, of Gladeville, Va., is President of the company.

Great Northern —The company has purchased the right of way through Red Lake Falls, Minn., and will begin grading and building the bridges for the branch to that town as soon as the weather will permit.

The tracklaying on the Pacific extension has been completed through Montana and Idaho, having reached the eastern state line of Washington last week. The force laying track from the west met those working from the east May 5, at a point about 20 miles from Bonner's Ferry. This leaves about 50 miles to complete the line from Kalispell as far west as Spokane. The bridge across the Pend d'Oreille River west of Sand Point, the present terminus of the line, has been finished. Track has been laid east from Spokane, and, with the grading completed, one crew will work west from Sand Point and another east from Spokane, so that by June 1 the gap will be closed and trains can be run into Spokane. The tracklayers average between 11,000 and 14,000 ft. of track daily.

Greensborough & Federalsburg.—Some misunderstanding has arisen between the Commissioners of Caroline County, Md., and the Philadelphia, Wilmington & Baltimore road with reference to building the Greensborough and Federalsburg road. The railroad officers state that their understanding has been that Caroline County would furnish the right of way, besides the subscription of $60,000, and unless this was done the road would not be built.

Hancock & Calumet.—The survey of a route for a line between Lake Linden and Calumet in the Upper Michigan Peninsula has been commenced. This road will connect the Mineral Range and Hancock & Calumet roads which are owned in the same interest.

Houston Belt.—It is intended to have the road under contract in June, but the locating survey is yet to be made. The road will be 18 or 21 miles long, the length

depending on the route chosen. All of the right of way along the line has been guaranteed, except a few pieces which will have to be condemned.

Huntsville & Monte Sano.—It is stated that the road is to be extended from the point where it reaches the top of the mountain, near Huntsville, Ala., to Lily Lake at the south end, and the company is to operate a line of steamers through the lake to the north side. Permission has been given to alter the bridge on the south end of the lake and put in a draw.

Illinois & Iowa Railroad & Terminal Co.—It is intended to begin surveys for this road in a few weeks. The bill granting a charter for a bridge across the Mississippi River at Moline has passed the House, and has been favorably reported from the committee to the Senate. When it becomes a law the company will be ready to begin active construction work. The company has been organized to build terminals on both sides of the Mississippi River, at Davenport, Ia., and at Moline and Rock Island, Ill. A road will be built from Davenport north to Clinton, Ia., via the intermediate towns of Pleasantville, Le Claire and Princeton, a distance of about 38 miles. George C. Baker, of Davenport, is Chief Engineer.

Iowa & Minnesota.—Articles of incorporation of the company were filed for record at Sioux City, Ia., last week. The company announces its purpose to build a road from Council Bluffs northeast through Iowa and Minnesota. Its authorized capital is $5,000,000, and $100,000 is reported subscribed. The route of the road proposed by the company is not made public.

Mankato & Northeastern.—Right of way has been granted through the city of Mankato along the bank of the Minnesota River. The ordinance requires the company to complete 50 miles of track before July 1, 1894.

Middlesex Valley.—The charter for this company was filed in New York this week. The company was organized some time ago to construct a road from Academy street, in the village of Naples, Ontario County, to the station of the Lehigh Valley Railroad, in the village of Geneva, N. Y., a distance of about 24 miles. The company has secured most of the right of way.

New Roads.—W. R. Burt, of Saginaw, Mich., writes that he has had a preliminary survey made for some distance out of Toledo for a proposed road to Detroit. Nothing further has been done since this survey was made during the spring, and it is still uncertain whether any work will be done this year.

Tracklaying on the Thompson's Run coal road, which is being built by New Castle capitalists, will be commenced June 1. The road is 3¼ miles long and in that distance rises 400 ft., or at the rate of about 125 ft. to the mile. It will connect with the Pennsylvania lines, the Pittsburgh & Western and the Pittsburgh & Lake Erie road at Ellwood Junction.

Norfolk & Western.—This company is pushing the construction work on the Ohio extension with all possible rapidity. Capt. W. R. Craiger, the Superintendent of Construction, has received orders to employ enough more men to make the number at work on the line 1,000, so that the road may be completed in August. The force of men now at work is supplemented by five construction trains.

The company will build many new branches from the Ohio River extension this summer to reach coal and timber lands off from the main line of the road, and, while the aggregate mileage will be considerable, it is not likely to come up to 80 miles, as some reports state.

Northern Pacific.—The grading on the Yakima & Pacific Coast, which is the chartered name of the branch being built from Chehalis to South Bend, Wash., has been completed for over 40 miles, or about 75 per cent. of the distance to the Pacific coast. The track is down for 43 per cent. of the distance, that portion west of the Chehalis River having been completed this year. Griggs & Heustis, of Tacoma, are the contractors for the grading and bridging. The work is not very difficult, the maximum grade being 1.8 per cent. and the curvature 12 degrees. The only important bridge work is a combination iron and wood bridge over the south fork of the Willapa River at South Bend, with a 200 ft. draw span. On the Tacoma, Olympia & Gray's Harbor road, which is being built from Centralia to Gray's Harbor, the construction work is practically finished, excepting a few miles of surfacing.

Pennsylvania.—D. F. Keenan, of Philadelphia, who has the contract for the extension of the Turtle Creek Valley branch from Murraysville, Pa., has begun work east of that point to complete the road to Delmont. The extension will be built through a new coal region in Clearfield County, near Penn, Franklin and Salem townships, where coal deposits have recently been purchased by Philadelphia firms.

The branch from Allen's Lane, north of Philadelphia, to Fort Washington, where it connects with the Trenton cut-off, is being pushed with great rapidity. All of the archways and bridges are being built in the most substantial manner, and heavy cuts are made to reduce grades. The roadbed is being graded for two tracks. A line has been surveyed beyond the cut-off toward Ambler.

The company will shortly commence double-tracking the Schuylkill Valley branch from Mont Clare, opposite Phœnixville, to Pottstown, Pa.

Philadelphia & Northern.—The preliminary survey for the construction of the proposed branch to extend from the Philadelphia & Reading, at Glenside, to Wistar Station, on the Germantown branch, is being made. So far the lines run from Glenside down the valley to Tacony Creek, Ashburne, and to Tabor Station, thence southwest to Pittville, near the National Cemetery. The property required is very valuable, but already a large portion of the right of way has been secured, and the agents are working vigorously to obtain all the land required without lawsuits, if possible. The new branch will relieve the main line of the through trains and increase the facilities for suburban trains between Jenkintown and Mayre Junction, Philadelphia.

Philadelphia, Wilmington & Baltimore.—A second track is to be built for about four miles on the Central Division between Media and Wawa, Pa.

Powelton & Pocahontas.—The preliminary survey for the extension of this line has been commenced, and is being pushed from Mt. Carbon Station, W. Va., to the Norfolk & Western. The road is now in operation for a short distance from the Chesapeake & Ohio to Mt. Carbon, and the extension is to carry it to a junction with the Norfolk & Western, and will open extensive coal fields. The distance is estimated at 60 miles.

St. Louis, Chicago & St. Paul.—The company filed articles of incorporation at Springfield, Ill., last week. It is proposed to build a road from East St. Louis, through St. Clair and Madison counties, to the city of Alton, near the present terminus of the St. Louis, Alton & Springfield road thence through Jersey, Macoupin, Morgan and Sangamon counties to Springfield. The principal office is to be at Alton, and the capital stock is $2,000,000.

St. Louis, Grand Tower & Southern.—The contract is reported to have been let to Cockerill & Brown, of St. Louis, for the grading of the first 90 miles from East St. Louis to Cairo, a total distance of 140 miles. The line has been located along the east bank of the Mississippi River, through Chester and Grand Tower, and the present contract will end at a point about 20 miles south of the latter town. The maximum grades on this section will be 16 ft. per mile and the curves four degrees.

St. Paul & Duluth.—A five-mile branch is being built from Miller to the quarries of the Sandstone Water Power Co. The grade is being reduced at Brown's Hill to 15 ft. per mile; the amount of earth to be moved is 53,000 cu. yds. and the extreme haul is two miles. It is probable that the Stacy Hill grade will also be reduced. When these improvements are completed the same engines will haul 42 loads instead of 32 as now.

Southern California.—The Sante Fe & Santa Monica Railroad, which is being built as a branch of this line, will probably be completed early in June. The contractors, Bright & Crandall, of St. Bernardino, Cal., commenced construction on April 15. The new road will leave the present Redondo line at Mesmer and extend northwesterly to the coast at Santa Monica, on the coast, a distance of about 5½ miles. The work is light and is over a level country. The grading has been finished for some distance and it was proposed to begin the tracklaying this week.

Southbridge, Sturbridge & Brookfield.—A new charter for this company was filed in Massachusetts last week. The capital stock is $130,000. The road is to be about 13 miles long, extending from Brookfield south to Southbridge, Mass. It is said that some right of way has been secured.

South Florida.—The extension of the Pemberton Ferry Branch north of Pemberton, Fla., which was began last October has been completed to Inverness, to which point it has been opened for traffic, the distance being 21 miles. It is probable that this will be the terminus for some time to come.

Spokane & Cœur D'Alene City.—A company has been formed at Spokane, Wash., which will build an electric railroad line, 28 miles in length, connecting Spokane and Cœur D'Alene City. Engineers are in the field making the preliminary survey.

Springfield, Sedalia, Marshall & Northern.—A meeting of the Directors of the Brookfield & Northern, the Springfield, Sedalia, Marshall & Northern and the Sabine Pass, Sioux City & Duluth railroads was held at Kansas City May 5, to arrange a consolidation of the three roads and to begin construction work. The lines are projected north and south through Missouri, from Sedalia to Brookfield and to Springfield and there points.

Springfield, Yellville & White River.—The company commenced the construction on May 2 of the central section of its road from the mouth of Buffalo River on White River, to the mouth of George's Creek in Marion County, Ark. This work will be immediately followed by the construction of the next section west from the mouth of George's Creek to Harrison, Boone County, Ark. The section now building will pass through Onset and Yellville, to George's Creek. The character of the work is exceedingly hard, being nearly all rock work. After the first mile the road commences to ascend the mountains, making an 80 ft. per mile ascent for five miles, which will be the maximum grade. On this section of the line there will be no bridges of any importance except the bridge across Crooked Creek, which will have a span of 150 ft. The President of the company is Capt. Edward H. Webster, of Kansas City, Mo. The Chief Engineer is D. W. Pike, of Kansas City, Mo.

Superior Belt Railway & Terminal Co.—The contract for building six miles of single track trestle has been let to Grant & Foley, of St. Paul. The work is to be completed on Aug. 1, and extends from the Duluth & Winnipeg bridge at New Duluth to Allouez Bay, Superior.

Tacoma Eastern.—A party of 15 engineers is locating the line between Tacoma, Wash., and the Mineral Creek mining region. The survey is about 80 miles long and the company hopes to commence construction work southwest of Tacoma during the coming summer.

Union Pacific.—William Ashton, the Division Engineer in charge of the branch to the Acme Coal Co.'s mines near Trinidad, Col., states that the branch will be in operation on July 1. The line will be between seven and 10 miles long, from Road Junction about 12 miles from Trinidad.

Wellsville, Coudersport & Pine Creek.—The Directors have decided to extend the track from Genesee, N. Y., up the middle branch of the Genesee River, two miles to Perryville, in Potter County, Pa.

West Virginia, Alderson & Central.—A party of engineers under A. P. Bartholomew is making a survey up Meadow River in the Meadow Bluff district, in Greenbrier County, W. Va. A survey is being made south toward Alderson, on the Chesapeake & Ohio, a distance of 10 or 15 miles. The route so far graded shows a very fair grade, considering the mountainous country through which the lines have been run. S. E. Weir is the Chief Engineer.

Wichita Valley.—The proposed line along the Brazos River, from Seymour west to Benjamin, Tex., 30 miles, will, if built, be an extension of this line, and not of the Missouri, Kansas & Texas, as reported last week. The road is a branch of the Fort Worth & Denver City, now operated by the Union Pacific.

Wilkes-Barre & Eastern.—The work on the road between Wilkes-Barre and Stroudsburg, Pa., is being vigorously pushed. The engineers have 18 miles ready for the graders, and there are 250 men employed on the construction in Lehigh, at Stroudsburg and at Springbrook. As soon as the route for crossing the Stroudsburg Mountain can be determined, the work will go on with great rapidity. The route at the point named, so far as fixed, gives a grade of 65 ft. to the mile. The line will be about 57 miles long.

Yakima, Natchez & Eastern.—It is proposed to raise $100,000 by local subscription at Yakima, Wash., to aid in building the systems of narrow gauge roads proposed by this company. Lines are to be built from North Yakima west to the timber and coal fields of the Natchez Pass, to Priest's Rapids, to Sunnyside Station, in Yakima County, via Yakima City, up in the Ahtanum Valley and via Satis to Goldendale. Engineers have begun the survey for the first section of the line up the Natchez River. George McDonald, of Yakima, is President.

GENERAL RAILROAD NEWS.

Boston & Albany.—The statement of the operation of the road for the quarter ending March 31, as filed with the Massachusett Railroad Commissioners, together with that for the nine months of the fiscal year to the same date, is as belows:

Three months—Jan 1 to March 31.	1892.	1891.	Inc. or dec.
Gross earn	$2,321,454	$2,121,928	I. $199,525
Oper. expenses	1,417,186	1,533,442	D. 116,257
Net earn	$904,268	$588,485	I. $315,782
Fixed charges	150,717	211,227	D. 60,510
Surplus	$753,550	$377,258	I. $376,292
Nine months—July 1 to March 31.	1891-92.	1889-90.	Inc. or dec.
Gross earn	$7,322,030	$6,865,445	I. $456,585
Oper. expenses	5,310,848	4,582,625	I. 728,223
Net earn	$2,011,182	$2,282,820	D. $271,638
Fixed charges	1,096,002	1,142,382	D. 46,380
Surplus	$915,179	$1,140,437	D. $225,258

Chesapeake & Ohio.—The statement of earnings for March is as follows:

Month of March:	1892.	1891.	Inc.
Gross earnings	$684,821	$665,660	$19,161
Operating expenses	532,136	515,835	16,301
Net earnings	$152,685	$149,825	$2,860
Nine Months:			
Gross earnings	$6,895,722	$6,055,065	$840,658
Operating expenses	5,109,083	4,443,571	665,513
Net earnings	$1,786,639	$1,611,494	$175,145

Cincinnati, Hamilton & Dayton.—The stockholders of the company, at a meeting in Cincinnati, voted to increase the capital stock of the company by the addition of 40,000 shares of common stock. An issue of $3,000,000 of five per cent. general mortgage bonds, to run 50 years, was also authorized.

Connecticut River.—This company some months ago applied to the Massachusetts legislature for the permission to increase its capital stock from $2,670,000 to $5,000,000 in order to enable it to double track the road, to lay two additional tracks from Springfield to Holyoke, to improve its terminal facilities at Springfield, and to eliminate grade crossings. The law was passed, but Governor Russell has vetoed it. The veto excites considerable interest, especially in view of the fact that a similar law in favor of the Boston & Albany a few years ago was not vetoed. The Governor in his message says:

"In the absence of any restriction in the bill this additional stock may, and no doubt will, be divided at its par value of $100 among the stockholders. The present market value of the stock is about $235 a share. So that in effect this bill authorizes the distribution to its stockholders of new stock, nearly equal in amount to the present stock, at less than one-half its present market value. The difference between its par and market value will be clear profit to each stockholder, and represents the proportion of new stock not necessary for the purposes of the company, and for which the company itself gets no benefit or return. Less than one-half of this proposed increase of stock, if sold at this market value, would yield to the company as much money as the whole increase so distributed to the stockholders. The bill, while in form an authorized increase of capital for the purposes of the company, practically gives the sanction of the commonwealth to the division among the stockholders of an enormous dividend. The proposed new stock is worth over $5,500,000 and of this $2,500,000 will go into the treasury of the company, and more than $3,000,000 into the pockets of the stockholders. Nearly one and one half million of dollars of unnecessary stock is added to the capital, the dividends upon which at 10 per cent. place an unnecessary burden of $150,000 each year upon the business of the railroad—that is, upon the public. Meanwhile this unnecessary increase of capital adds nothing to the resources of the railroad, to the facilities for its use or to the compensation of those who make such use practicable.

* * * I believe it to be my duty, before giving my approval to such a measure, carefully to consider whether the public cannot properly and justly interfere to prevent such burden. I believe such interference is proper, and that a sound public policy requires its exercise. At least it requires that the commonwealth shall not actively co-operate in placing the burden upon the public by grant of the necessary authority.

I recognize and appreciate all the rights of capital, and would guard them with most conservative and scrupulous care, and, remembering the great public convenience which they serve, would grant them every just demand. But the rights of the public should be guarded as zealously, and asserted as against the personal wish or benefit of the individual. Our supreme judicial court has clearly defined the trust relation of a railroad company to the public. * * *

And the same principles have been repeatedly and uniformly recognized and affirmed by all courts, national and state, and by legislation everywhere in our country. They are fundamental law. This company has a valuable property in its railroad, for which it is entitled to all just protection and consideration. But it is a property to which, in its origin, a public trust is attached. Because of this public trust the property is exempt from certain taxation, and is given by law extraordinary powers and privileges. * * * As with other trustees, they cannot be allowed in any way to depreciate or unnecessarily burden their trust; nor, in disregard of its obligations and duties, to look exclusively in its administration to their own benefit and profit.

I know and appreciate the argument that an increase in the value of the stock of a railroad company, caused by its prudent management and extension of business, belongs to the company. But requiring the disposition at its market value of any new stock created does not conflict with this right. It gives to the company the whole benefit of such increase. It prevents the issue of stock more in amount than is necessary to raise the sum

needed. It saves to the individual stockholder any depreciation of his stock likely to follow from such unnecessary addition to the capital, and to the beneficiary public the burdensome charge of paying a dividend upon it. A needless burden is always an unjust burden.

. . . For these reasons I believe the interests alike of the public, the railroad company and in the long run of its stockholders, require that some provision should be made for the disposition of said stock at its market value, where such market value is largely in excess of its par value. If there is objection to its sale by auction, the option might well be given to the stockholders to take it at a fair value, to be determined by the Board of Railroad Commissioners.

In giving authority last year to the Boston & Lowell to increase its capital stock it was expressely required that the new stock should be sold at public auction. Other great railroad corporations, such as the Old Colony and the West End, have without compulsion of law, sold their new stock at auction, and every gas company chartered in this commonwealth is required by law to do so.

Corning, Cowanesque & Antrim.—The directors of this company will petition the New York Supreme Court to change the name of the line to the Fall Brook road. The road is part of the railroad system of the Fall Brook Coal Co., and extends from Corning to Tiadaghton, N. Y., 51 miles, with a branch to Antrim, 17 miles.

Fall River, Warren & Providence.—The Old Colony Railroad Co. purchased at auction May 9, the franchise and property of this road for $365,155. The line is six miles long, extending from Fall River to Warren, R. I., and has been controlled by the Old Colony for some years.

Fitchburg.—The company reports a gross gain of $24,413 in the March earnings, a surplus gain of $110,806 for the March quarter, and of $154,907 for the nine months ended March 31. The dividend surplus for that period is $650,295. It requires $659,904 to pay four per cent. on the preferred stock, and that has practically been earned in the nine months, leaving three months' net earnings for betterments or surplus. The following is the report for the three months to March 31:

	1892.	1891.	Inc. or dec.
Gross earn	$1,675,154	$1,614,589	I. $60,615
Oper. exps	1,220,668	1,288,764	D. 68,096
Net earnings	$454,486	$325,775	I. $128,711
Other income	12,835	11,608	I. 1,226
Total income	$467,321	$337,383	I. $129,938
Fixed charges	366,956	347,824	I. 19,132
Net income	$100,365	Def. $10,440	I. $110,805

Green Bay, Winona & St. Paul.—The reorganization committee gives notice that about 90 per cent. of the first mortgage bonds and a large majority of the underlying securities and stocks of the company have been deposited with the Farmers' Loan & Trust Company under the plan of reorganization and a penalty of 2 per cent. will be imposed upon all securities received after May 14 next.

Pennsylvania, Poughkeepsie & Boston.—Under a temporary arrangement the Philadelphia & Reading has assumed control of the road, and will operate it as the agent of the Receiver until the receivership is vacated by the courts. It is expected that this will be done shortly, and that by Aug. 1, when the Reading will take possession of the Poughkeepsie Bridge and the Central New England & Western Railroad, under the pending plan of reorganization, it will also be in full control of this road and of the Dutchess County line, the branch from Poughkeepsie southeast to Hopewell Junction, on the New York & New England, 12 miles. The branch is fully completed, and a special train was run over the line last week.

Philadelphia & Seashore.—The West Jersey Railroad has, it is reported, decided to operate its recently purchased acquisition, the Philadelphia & Seashore Railroad. The road is being placed in good condition, and express trains to the South Jersey seashore resorts may run over it. The route to Ocean City, Sea Isle City and Avalon will be shorter by from eight to twelve miles than it has been on the West Jersey.

The stockholders and bondholders of the company have appealed from the decision of the Chancellor confirming the sale of the Seashore road to the Pennsylvania for $185,000.

Poughkeepsie Bridge Co.—The Reorganization Committee of the Poughkeepsie Bridge Co. and the Central New England & Western Railroad announces that a large majority of the stock and mortgage securities have been deposited under the plan and agreement for the reorganization of both properties. The committee will immediately begin amicable foreclosure proceedings.

About $4,000,000 of the $5,000,000 Poughkeepsie Bridge bonds have been deposited. Each holder of a $1,000 bond will get a four per cent. bond for $750, guaranteed by the Reading, and $250 in series B bonds.

Malone & Schenectady.—The Adirondack & St. Lawrence last week filed at Albany, N. Y., an order issued by the Supreme Court, of New York, allowing the name of the road to be changed to the Malone & Schenectady.

Mobile & Ohio.—The contest made by the stockholders to secure possession of the road was practically decided in their favor by a decision of the Chancellor at Mobile last week. The Chancellor decides that the tender recently made by the stockholders' committee for the payment of the remaining outstanding bonds was valid and effective, and that the entire $8,000,000 debenture bonds are extinguished by the creation of the new general mortgage. The judge also dismissed the cross bill and cross injunction of the Farmers' Loan & Trust Co. and of the bondholders, who are at present in possession, and thus annuls the voting trust under which the Farmers' Loan & Trust Co. and the bondholders have been assuming to act. It also restores the power to the stockholders. The stockholders recently elected their own board at Mobile and demanded possession of the road. The decision of the Chancellor recognizes the validity of their demand.

New York Central & Hudson River.—The gross earnings for April, 1892, were $3,635,848, and for April, 1891, $3,341,010, an increase of $294,838.

New York, Chicago & St. Louis.—The annual report shows gross earnings for the year of $6,171,089, the largest in the history of the road, being an increase of $350,783 over 1890. The operating expenses were $4,911,208, an increase of $367,948 over the previous year, leaving the net earnings $1,024,425, a decrease as compared with 1890 of $29,915. On March 1 a dividend of 3 per cent. was paid on the first preferred stock. The net income is $1,638,024. The total fixed charges for the year 4 were $880,360, leaving a balance of $157,664, as compared with $188,826 in 1890.

New York & New England.—President Parsons has forwarded to stockholders a circular asking their assent to the issue of a series of consolidated mortgage bonds, not exceeding in the aggregate the sum of $25,000,000, with 5 per cent. interest. This is in accordance with the vote of the stockholders at the annual meeting giving the directors authority to issue bonds subject to the written approval of the stockholders.

New York, New Haven & Hartford.—The statement for the quarter ending March 31, as submitted to the Connecticut State Railroad Commission, shows:

	1892.	1891.	Inc. or dec.
Gross earnings	$2,637,635	$2,569,591	I. $68,044
Oper. expen	1,747,076	1,960,693	D. 213,617
Net earnings	$889,559	$608,898	I. $281,661
Other income	62,341	80,120	D. 17,779
Total income	$952,900	$689,018	I. $263,882
Fixed charges	420,500	424,659	D. 4,159
Balance	$532,400	$264,359	I. $268,041

Richmond & West Point Terminal.—The reorganization committee has again extended the time for deposits to May 16. The following securities had been deposited when the last report was made; Richmond Terminal securities: Common stock, $60,775,400; preferred stock, $3,759,300; collateral trust five per cent. bonds, $7,828,000; collateral trust six per cent bonds, $2,206,000; total, $74,568,700. East Tennessee, Virginia & Georgia securities: First preferred stock, $881,100; second preferred stock, $6,076,000; common stock, $12,501,900; total, $19,359,000; other stocks not guaranteed, $574,500; guaranteed stocks and underlying bonds, $2,578,200; guaranteed stocks with other depositaries, $828,000; letters pledging deposits under conditions, $2,486,000; a total of $100,304,400. At the last meeting of the committee it was shown that practically no progress had been made in securing the assent of the underlying security holders to the plan of reorganization. It is now believed that a modification of the plan cannot be avoided.

Tennessee Midland.—At a special meeting at Memphis, May 6, the stockholders approved the execution of a mortgage securing issues of $11,000 per mile of first mortgage five per cent. bonds, in lieu of the present authorized issues, reducing the bonded indebtedness of the company by $10,000 a mile.

Wabash.—The road reports gross earnings for March of $266,628, a decrease of $8,388 as compared with the same month of last year, and net, $87,293, an increase of $5,713. For the nine months ending March 31 the gross earnings were $11,257,984, an increase of $1,310,786 as compared with the corresponding period of last year, and net, $2,918,420, an increase of $199,075.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, May 11, 1892.

The Eastern roads are not disposed to let the reduced sixth class rates stand without further effort to induce the St. Louis lines to restore rates and conferences are being held having this in view. An effort was made last week to restore all sixth class rates except grain and its products, but was not successful. It was then proposed to take out lumber and restore that rate to the 25 cent basis, but it was not considered advisable to establish a commodity rate.

The announcement that the Pennsylvania would give orders for the selling and acceptance of a 1,000-mile ticket at $20, flat, has caused considerable feeling among the weaker trunk lines, as the use of this ticket virtually cuts the rate to New York.

Reports are current that a rate of $13 from Pittsburgh has been quoted for special parties to the Republican National Convention at Minneapolis, a cut of $10. All the interested lines deny any knowledge of such inducements, but the report may be seized upon by some line as a pretext for reducing the rate.

It is probable that many of the Chicago lines will run low-fare excursions to Chicago this summer for parties desiring to visit the Exposition grounds.

The Western Passenger Association at its meeting at Hot Springs voted to run two harvest excursions this season, one Aug. 30 and the other Sept. 27. A committee was appointed to consider the proposition for an interchangeable 5,000 mile ticket.

At the regular monthly meeting of the Western Freight Association this week, the Burlington proposed that a two-thirds vote, instead of a majority vote, be required to authorize a reduction in rates; and that in case a line desires to adopt reduced rates, notwithstanding an adverse vote in the association, 30 days', instead of 10 days' notice shall be given. The proposition also makes provision for the election of an executive committee, comprised of a vice-president or general manager from each road, to decide upon questions of rates and divisions, fix salaries and audit expenses.

The Southern Pacific recently made application to the Commissioners of the Western Traffic Association to be allowed to reduce the passenger rates, both first and second class, between Los Angeles and El Paso. The road claimed the right to do this independently of any association obligations, by reason of its traffic contract with the Atchison, Topeka & Santa Fé, but the Santa Fé objected, claiming that under the agreement the traffic in question was competitive and subject to the Western traffic agreement. This claim is sustained by the Commissioners, who say:

"The application was placed upon the ground that there is a difference of only $1.50 in the passenger rates between El Paso and Los Angeles and El Paso and San Francisco; so that passengers can purchase either San Francisco or El Paso tickets and scalp them en route; the object of the change being to narrow the margin so that there will be less incentive for scalpers. The rate between El Paso and San Francisco is low. To reduce an intermediate rate in order to minimize opportunities for scalping might be proper in a case where other lines would not be too disastrously affected, and where every practicable measure had been taken to overcome the difficulty in other ways. In the present case the westbound rates of the Sante Fé would be reduced for a long distance from El Paso, and its east-bound rates would also be reduced for a considerable distance east from Los Angeles. These reductions would be so considerable that the Sante Fé would be confronted with the question of whether it would not better withdraw from the business between El Paso and Los Angeles. The Commissioners are not satisfied that the difficulties complained of cannot in a great degree be overcome in other ways. It appears that stop-over privileges are allowed on the San Francisco tickets in question. A ticket between El Paso and San Francisco, in either direction, limited to a continuous passage, could not be scalped en route, and the Commissioners are unable to see why it is not open to the lines to so restrict tickets passing through Los Angeles in either direction, as substantially to overcome the difficulties of the case. Such methods of handling traffic have been successfully employed elsewhere. Until an effort has been made to protect the present rates by the use of methods found practicable elsewhere, the Commissioners are not willing to authorize the reduction proposed."

Traffic Notes.

The general passenger agents of the lines interested met at Cincinnati on Wednesday and agreed to restore passenger rates between Cincinnati and Chicago to the normal standard.

The Michigan Central is to put on an additional night train each way between Buffalo and Chicago, leaving Buffalo at 8 o'clock and Chicago at 5.

The Interstate Commerce Commission last week heard complaints at Cincinnati against the Cincinnati, New Orleans & Texas Pacific. The grievance seems to be that freight rates from Cincinnati proper are not so low as the proportion accepted by the road on shipments from New York to the same destinations.

The Philadelphia & Reading announces a reduction of 10 per cent. in the rates on anthracite coal and other raw material used by iron furnaces to points in Pennsylvania and New Jersey. The announcement seems to indicate that this reduction is only for manufacturers, but the apparent conflict with the law on interstate rates thus restrictedis not explained. A later report states that the Pennsylvania and the Baltimore & Ohio are parties to the arrangement, and that the reductions apply to all points where these three roads are competitive.

The name of Finley apparently is the *bete noir* of agreement-breakers in other places than Chicago. A Memphis paper states that Chairman Spence L. Finley, of the Memphis Passenger Association, has rendered a decision on charges preferred against the Louisville & Nashville for violation of the agreement regarding maintaining of rates. A fine of $50 was imposed for selling a ticket to Jelico, Tenn., via Louisville, which gave the ticket broker an opportunity to shade the tariff rate between Memphis and Louisville. Certain charges preferred against the Iron Mountain for cutting rates to St. Louis were not sustained.

Western Traffic Association.

The Advisory Board of this Association met in New York May 11, all the important roads being represented except the Union Pacific. A decision of the Commissioners holding the Chicago, Burlington & Quincy guilty of reducing certain wool rates contrary to the rules of the Association was approved by the Advisory Board and the officer of that road responsible for the reduction must now be discharged, according to the rules of the Association. The discharge of Traffic Manager Leeds by the President of the Missouri Pacific for a similar offense about a year ago is still fresh in the minds of people interested in the Association, and the probable action of the Burlington is therefore a subject of considerable speculation. The conviction by the Board of Commissioners several months ago of the Southern Pacific, the Atchison, Topeka & Santa Fe and the Atlantic & Pacific for jointly violating the agreement by cutting the rate on sugar eastbound from the Pacific coast was brought before the Advisory Board last winter, but action in the matter was postponed. It came up again this week and Vice-President J. C. Stubbs, of the Southern Pacific, read an explanation and justification of the alleged offense which had been prepared by President C. P. Huntington. This consisted mainly of the statement previously given that no sugar tariff for that route had been established, and the roads had been compelled to make their own. Mr. Huntington's statement was unanimously accepted as "satisfactory and conclusive" for all three roads. It was voted to except from the jurisdiction of the Western Traffic Association Texas, Arkansas, Indian Territory and Mexico. There has hitherto been some dispute as to the jurisdiction of the association over traffic to and from those sections of country. In the matter of commissions on second-class tickets to Pacific coast points, the meeting voted to sustain the Board of Commissioners in its refusal to permit the Atchison, Topeka & Santa Fe to reduce fares on such tickets for the purpose of meeting alleged excessive commissions. A committee submitted a form of agreement on this subject which is to be sent to the President of every company in the Western Traffic and the Transcontinental Associations for signature, to go into effect when signed by all, not later than June 1. In the event of its going into effect the Santa Fe will withdraw its notice for the reduction of rates.

On May 12 it was voted to reduce the number of commissioners of the Association to five, and Commissioner James Smith was not re-elected. Mr. Finley has just resigned, and there will therefore be one vacancy to fill. The Chicago, Burlington & Quincy and the Chicago, Rock Island & Pacific some time ago applied to the Commissioners to give them authority to reduce freight rates to common points in Colorado and Utah to such a figure as they claimed was being made by secret rebates and cuts. The Commissioners refused to authorize such reduction. The Burlington and the Rock Island thereupon appealed to the Advisory Board, and at the same time gave notice, according to the agreement, that in 90 days from April 23 they would put the rates in effect. The board took up the question and voted 8 to 7 in favor of reversing the Commissioners' decision, but a two-thirds vote is required, so the Commissioners' decision stands. The roads have given the usual 90 days' notice. A resolution was passed, at the instance of the Denver & Rio Grande, making the Colorado-Utah Association a subdivision of the Western Traffic Association, with power to determine questions arising in its territory, and with the right of appeal to the Western Traffic Association. The next meeting of the Advisory Board will be held in New York in July.

Eastbound Freight Shipments.

The eastbound rail shipments of freight from Chicago for the week ending May 7 amounted to 55,968 tons, against 57,912 for the preceding week, a decrease of 1,944 tons, and against 55,508 for the corresponding week last year, an increase of 460 tons. The Panhandle again did the largest business, carrying 8,719 tons, while the Michigan Central followed with 8,028 tons, the Fort Wayne with 7,000 tons, the Chicago & Erie with 6,891 tons.

GEO. WESTINGHOUSE, JR., President. T. W. WELSH, Supt. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE, General Manager.

THE WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

WESTINGHOUSE AUTOMATIC BRAKE

The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 325,000 cars. This includes (with plain brakes) 252,000 freight cars, which is about 23 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording the opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 173,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

E. L. ADREON, Manager. JOHN B. GRAY, Agent. C. C. HIGHAM, General Supt.

THE

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THE WESTINGHOUSE AIR BRAKE CO., Lessee,

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CHICAGO OFFICE, GRAND PACIFIC HOTEL.

LOCOMOTIVE BRAKES.

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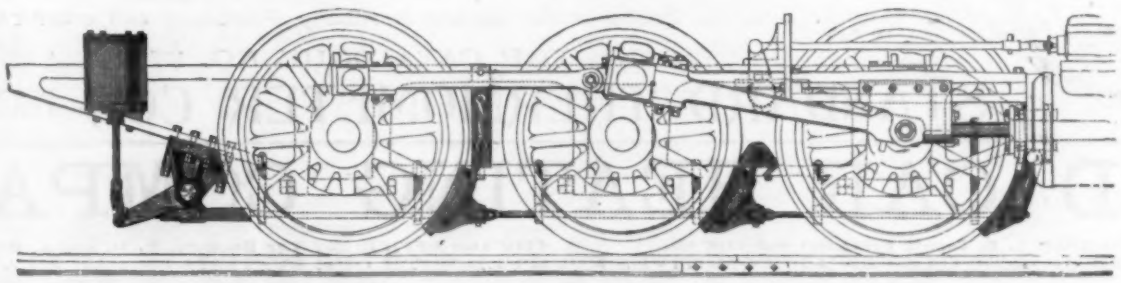
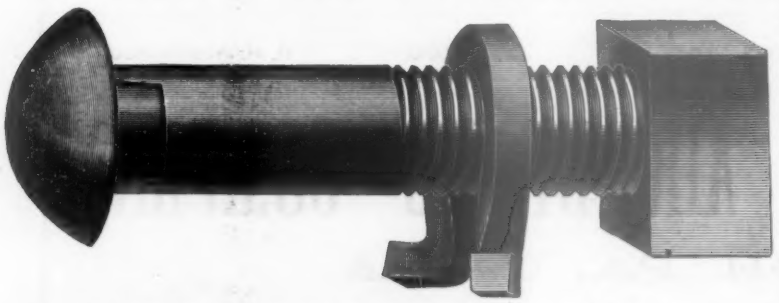


Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers, furnished to operate with either STEAM, AIR or VACUUM.

THE "STANDARD" NUT LOCK



Manufactured under D. O. Ward's Patents by the

STANDARD NUT LOCK CO.,

NOS. 236-248 BANK ST., NEWARK, N. J.

SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously; rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread* of *bolt*.

The nut lock for ¾ bolt made of ¼ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, *i. e.*, the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in *inwardly curved* extensions, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard *is* interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position, it offers double the locking friction of nut locks, which when in their *dead* "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

Excelsior Automatic Nut-Lock and Fish Plate Spring

These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best Nut Locks known.

Sample lots furnished for trial, free of expense, by forwarding the distance between centres of fish-plate bolts. Correspondence and orders solicited.

RUFFNER & DUNN,

Patentees and Sole Mfrs., SCHUYLKILL FALLS, Philadelphia, Pa.

Simple. Easily Applied. Very Effective.

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THE ONLY POSITIVE NUT LOCK IN COMBINATION WITH ELASTICITY.

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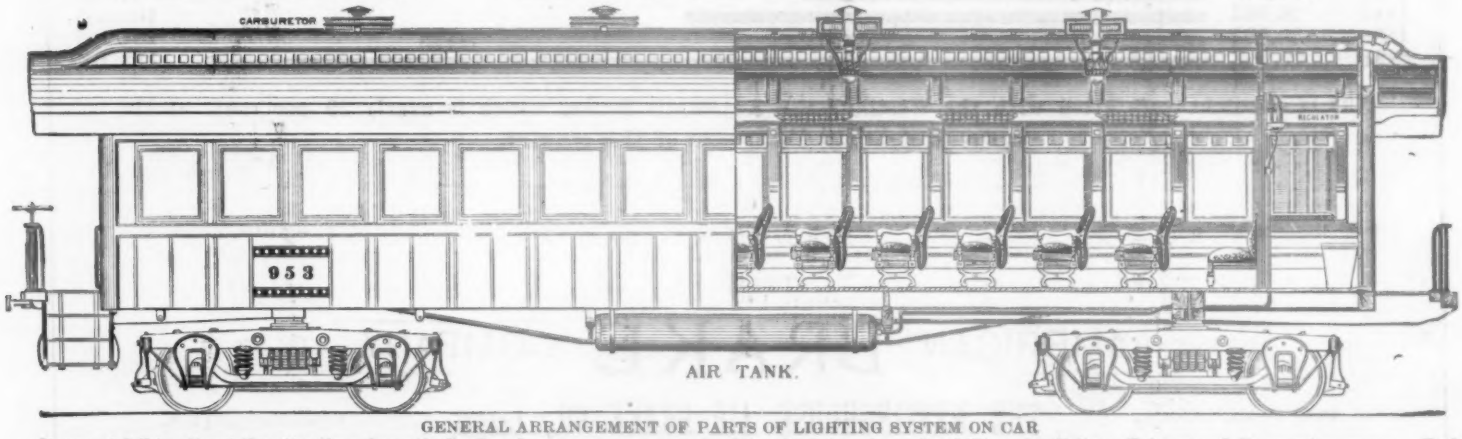

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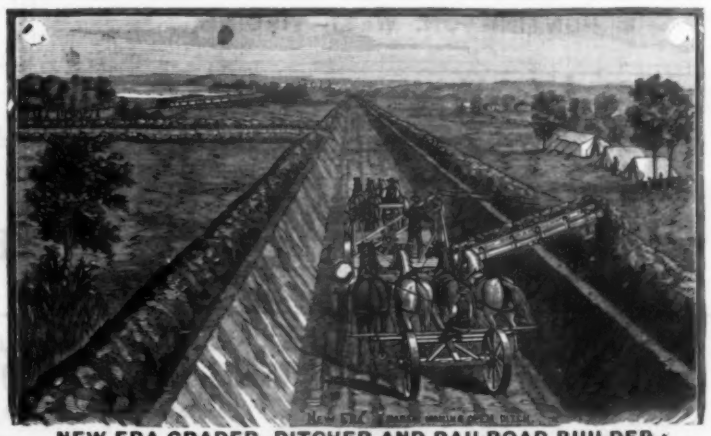

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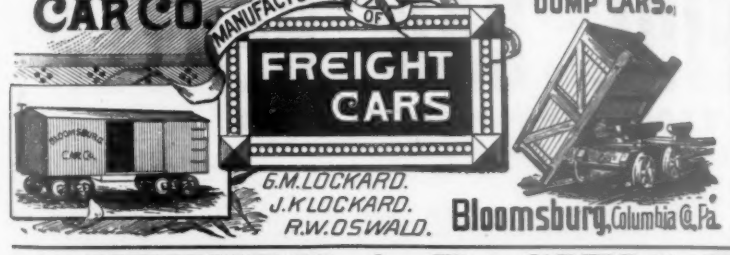
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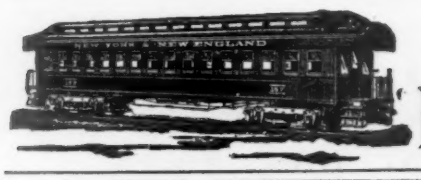

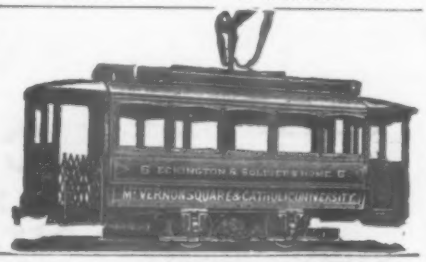

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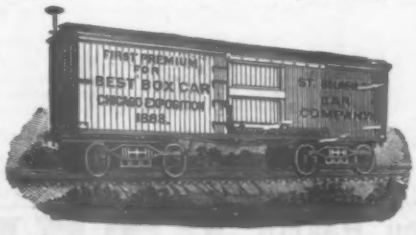

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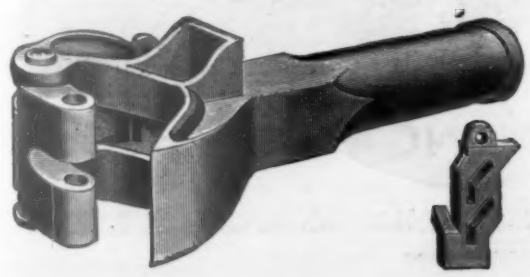

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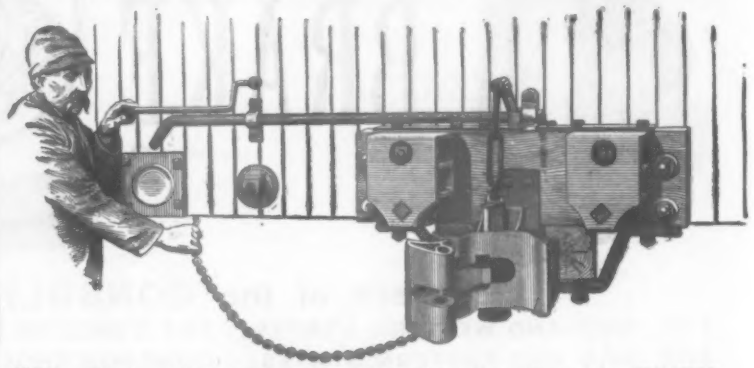

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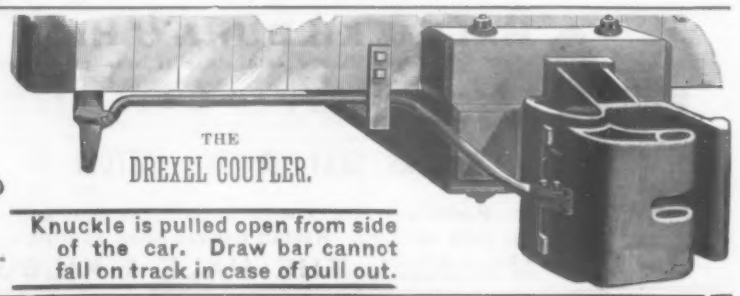

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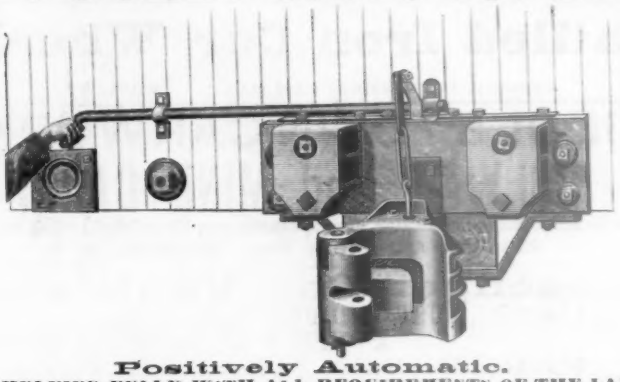

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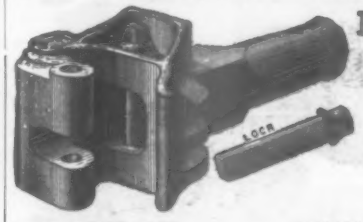

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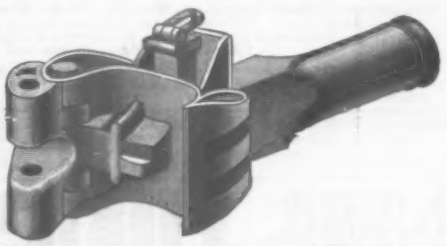

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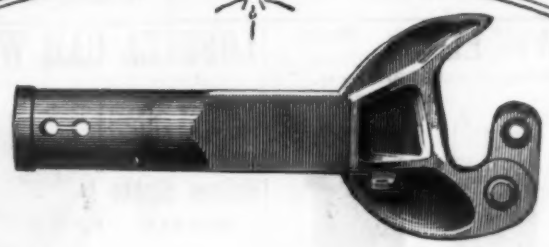

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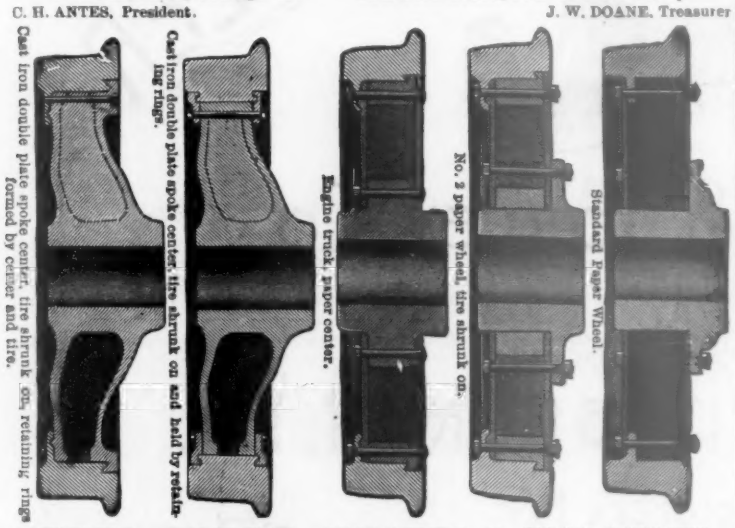
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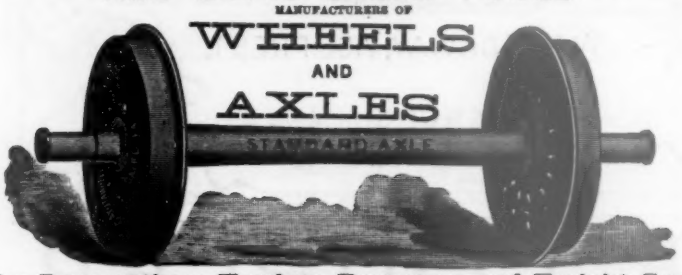

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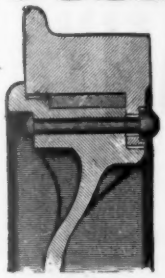

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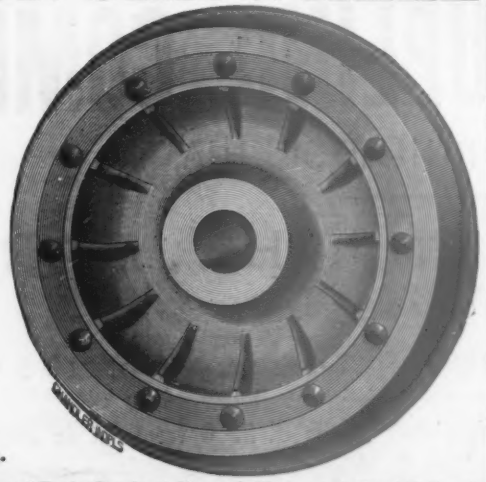

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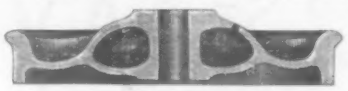

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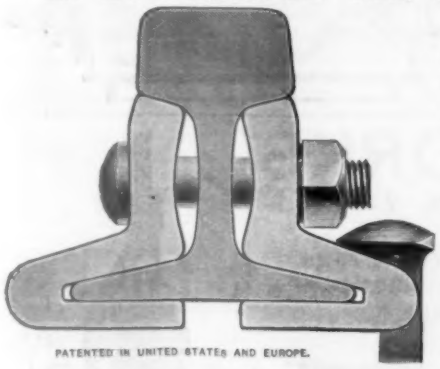

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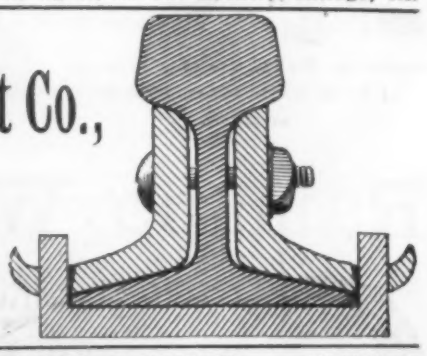

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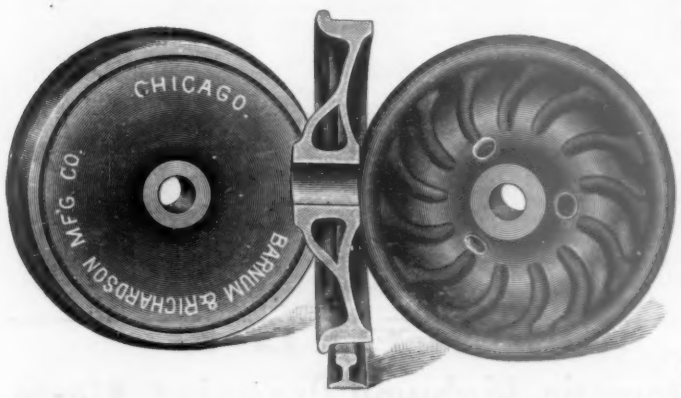

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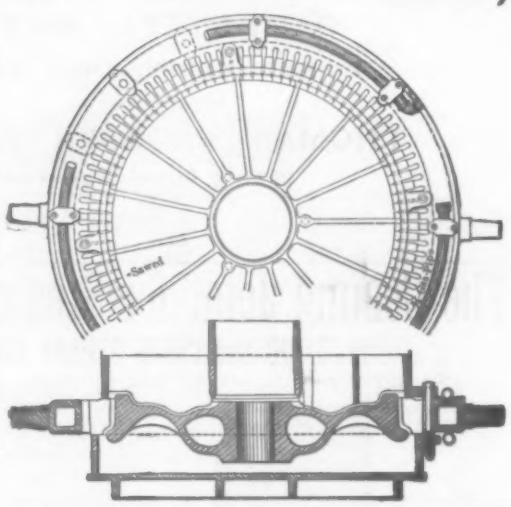

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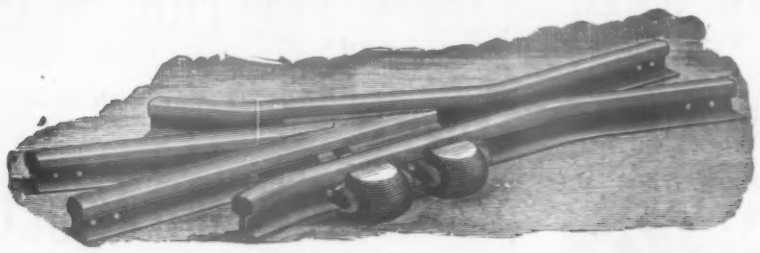

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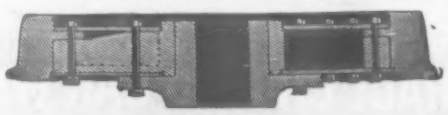

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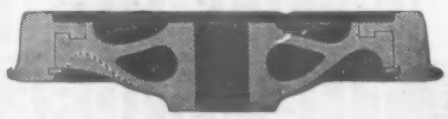

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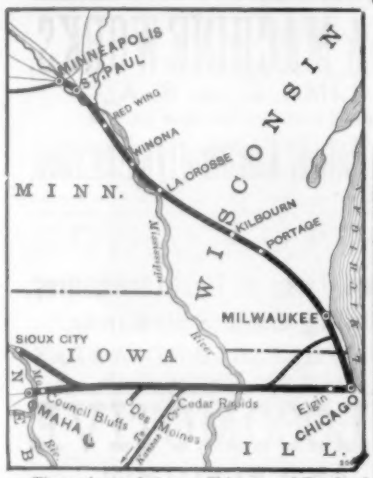

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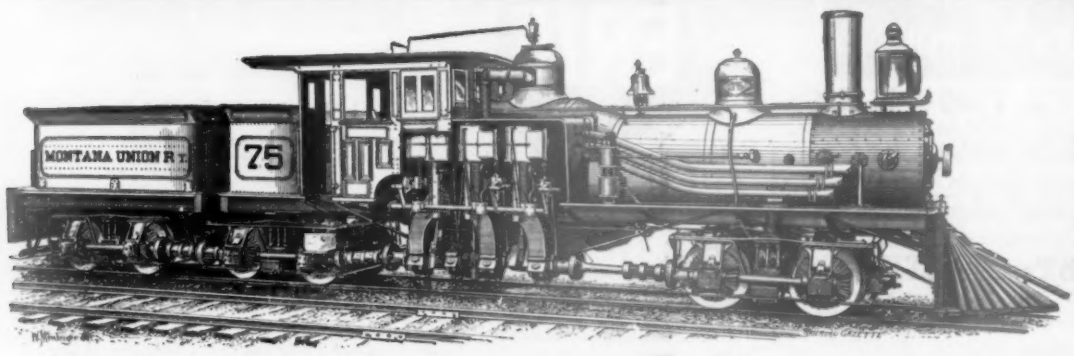

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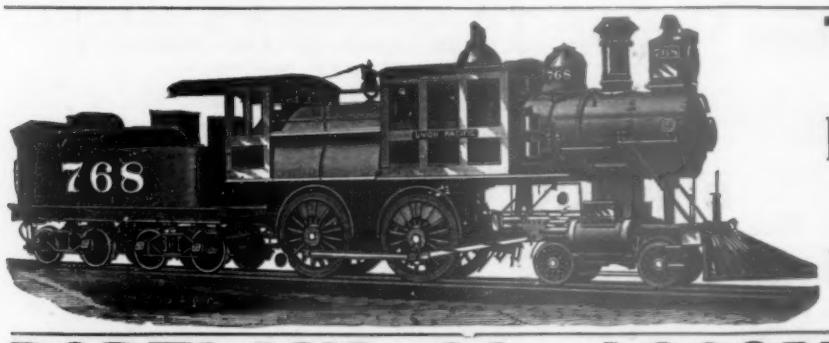

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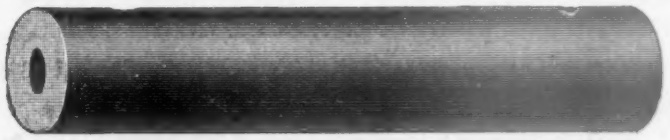

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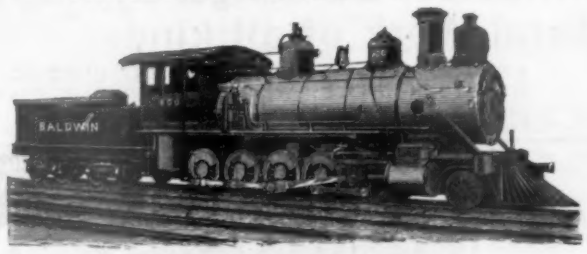

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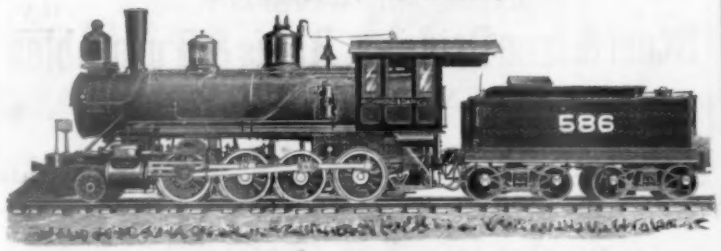

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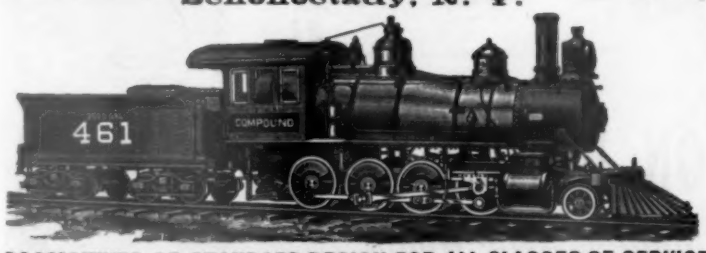

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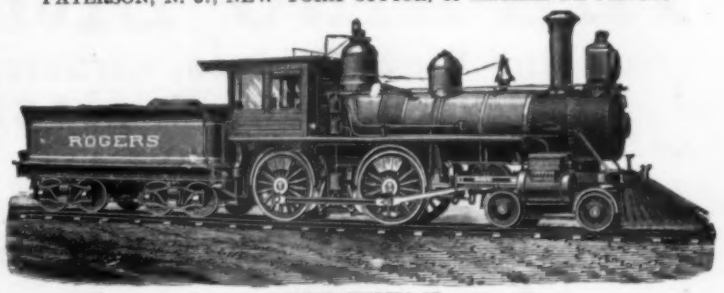

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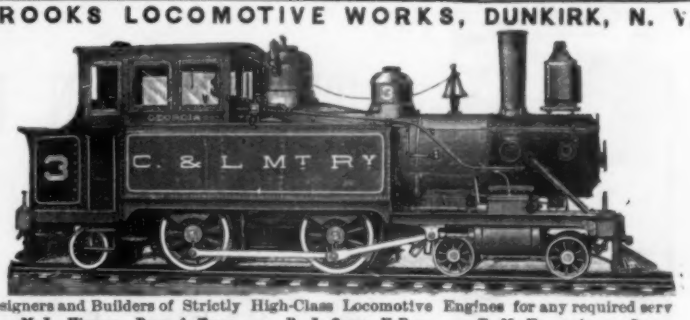

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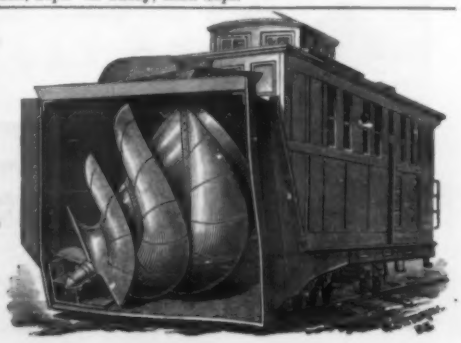

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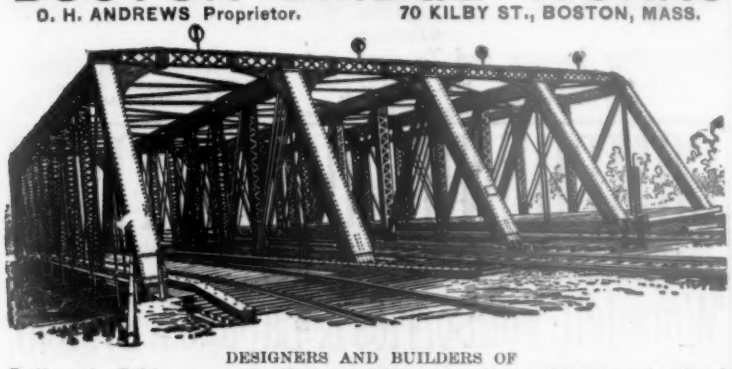

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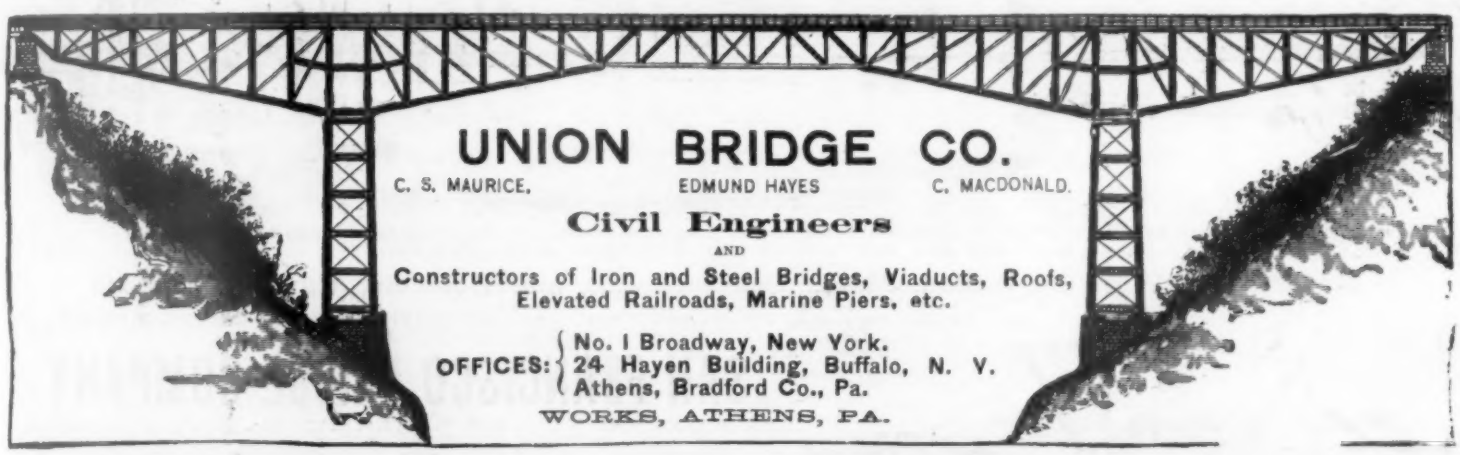

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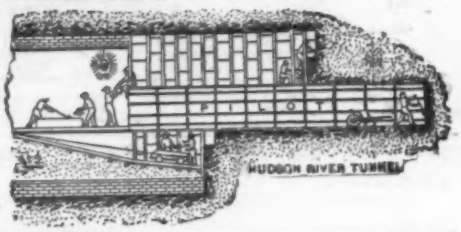

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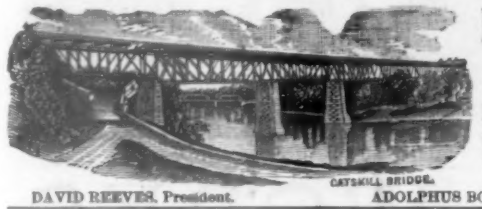

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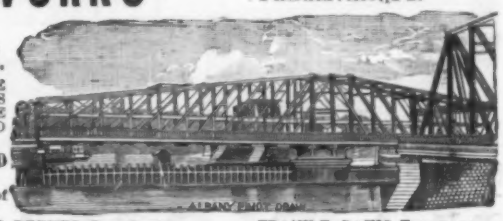

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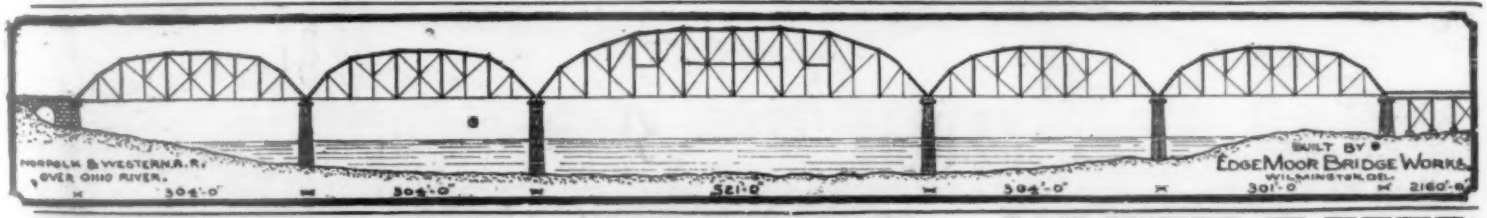

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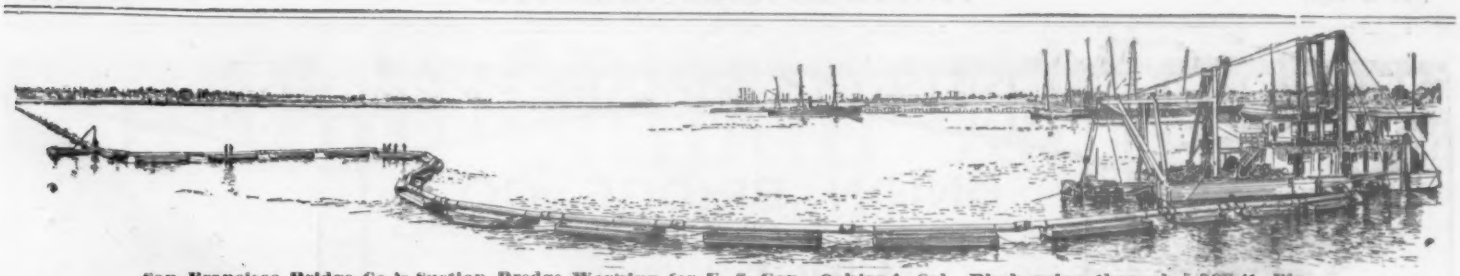

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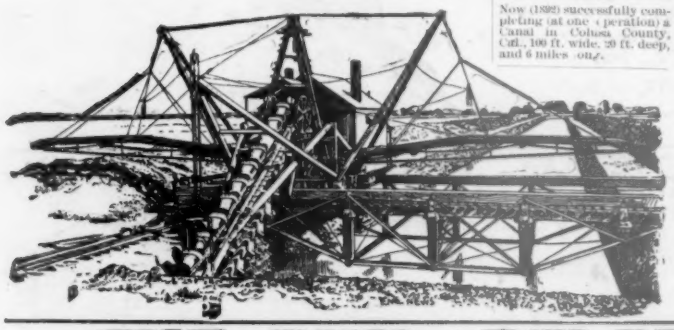

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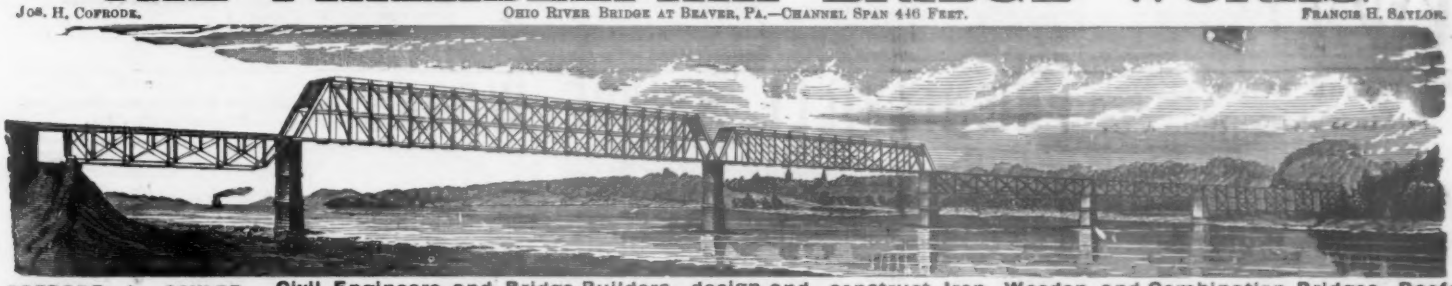

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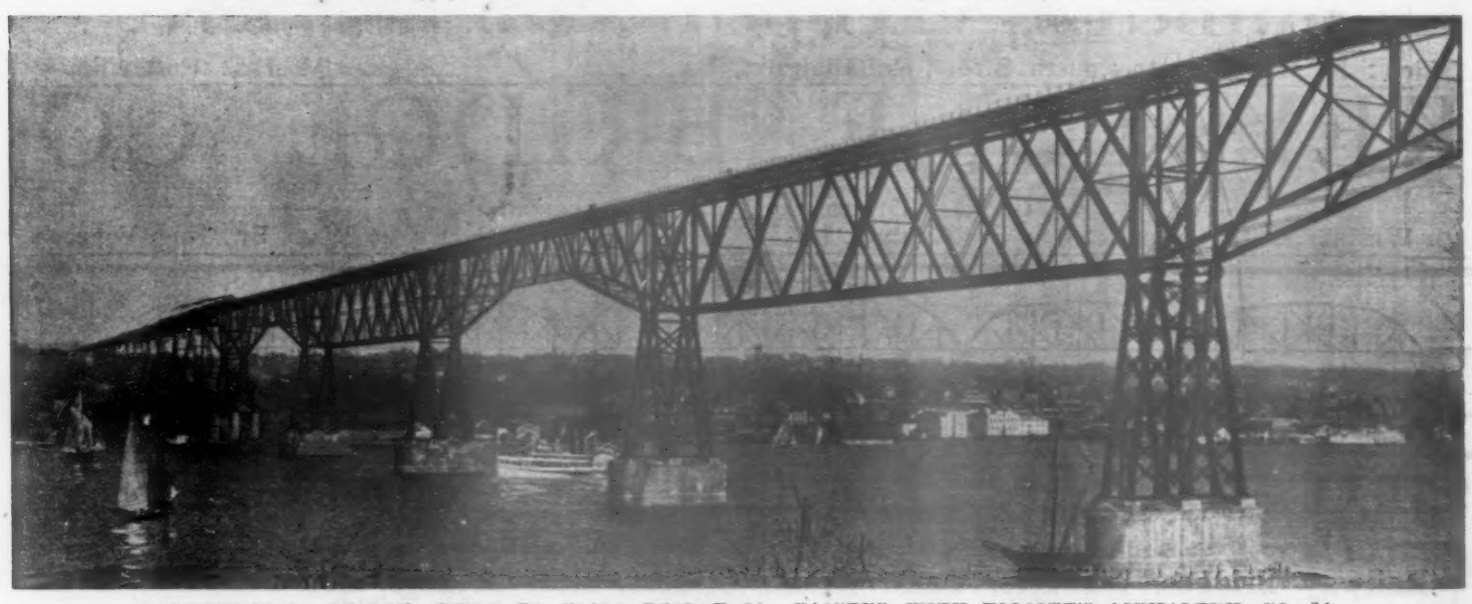

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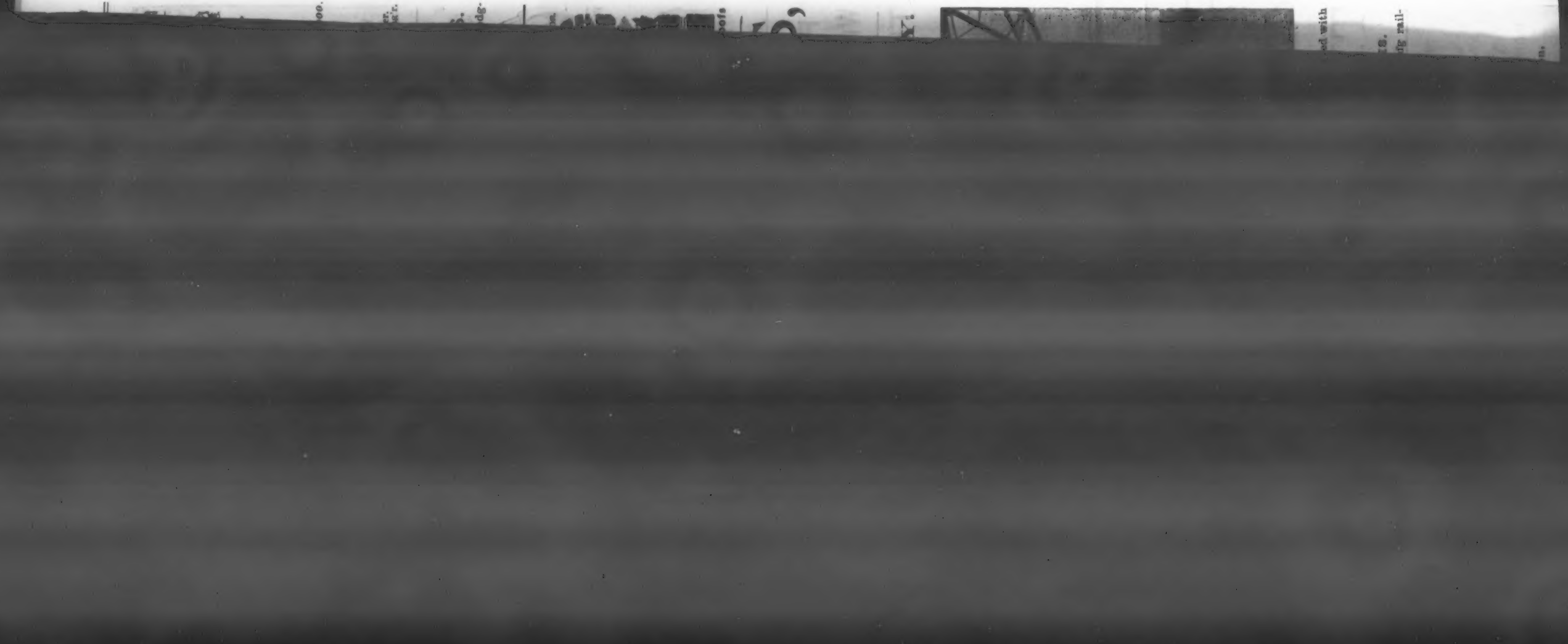
New C. O. R. R. Bridge, Cincinnati, O.	Keystone Bridge Co.	Pennsylvania R. R.	Ohio & Miss. R. R.
Poughkeepsie Bridge.	Edge Moor Bridge Works.	Richmond & Danville R. R.	Col., H. V. & Tol. R. R.
New London Draw Bridge.	Pencoyd Iron Works.	Atlantic Coast Line.	Lake Shore & M. S. R. R.
Denver Cable Road.	Passaic Rolling Mill Co.	East Tenn., Va. & Georgia R. R.	Western N. Y. & Pa. R. R.
Cantilever Bridge, Niagara Falls.	Standard Oil Co.	Texas Pacific R. R.	Southern Pacific R. R.
Harvard Bridge, Boston, Mass.	New York Central & H. R. R. R. Co.	Illinois Central R. R.	A., T. & S. Fé R. R.
U. S. Gov. Heavy Ordnance Works.	Boston & Albany R. R.	Chi. & Northwestern R. R.	Missouri Pacific R. R.

Samples, Price-Lists and References from those who have used and are now using these paints in your vicinity furnished on application.



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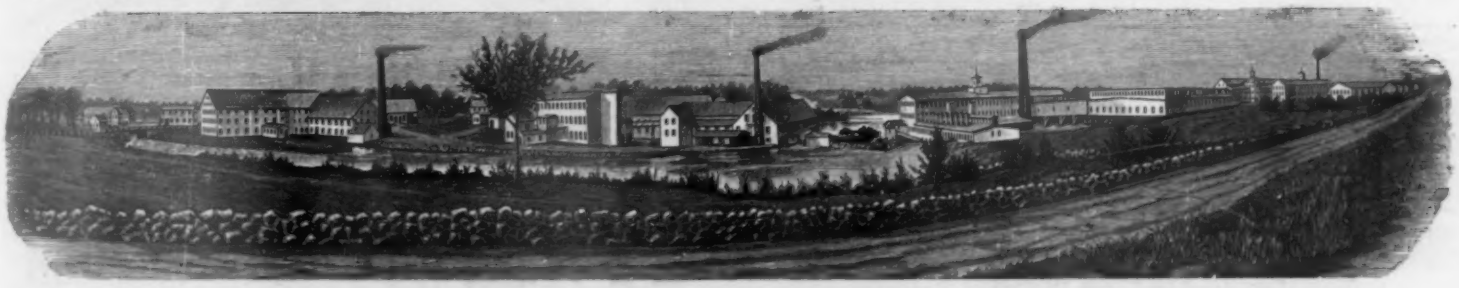

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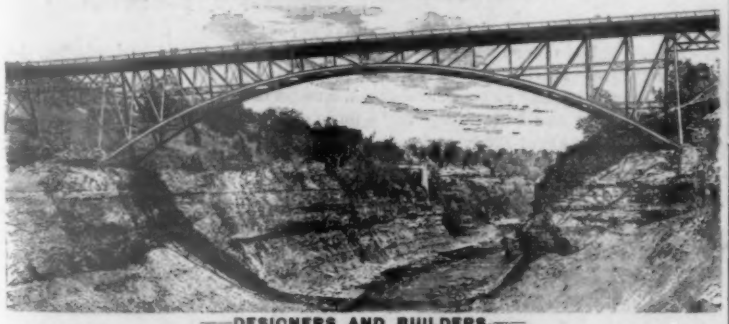

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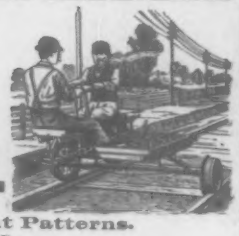

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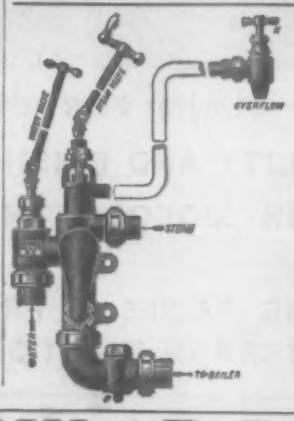

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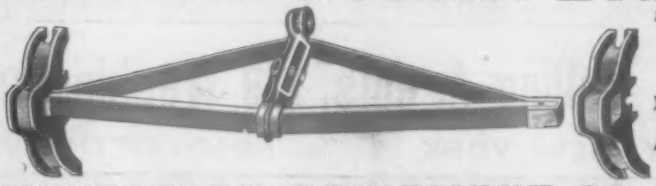

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